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THERAPEUTIC TESTS

The irrevocability of the surgeon's work adjures diagnostic exactitude only aspired to in other areas of medicine.

The variable responses of individuals to measures designed for their benefit are at once the abettors and the detractors of the physician's efforts—abettors in that the ability to compensate and adjust often neutralizes ill-chosen attempts, detractors in that the precision aimed at is often thwarted.

Therapeutic tests are warranted because other tests are frequently costly, discomforting, and at times impose more of a risk in morbidity and mortality than the condition itself. This is not to condone indiscriminate and empirical treatments undertaken in the often vain hope some good will ensure if not because of, then in spite of, the effort.

Therapeutic tests are entered upon advisedly just as are determinations of blood chemistry, roentgen studies, etc. Certain of them may even be as routine as complete blood count and urinalysis.

The patient with pyuria is entitled to a trial with antibiotics before being subjected to cystoscopy and retrograde pyelography. A sufferer from symptoms of pheochromocytoma deserves the therapeutic trial of restoring the relationship of the lower thoracic vertebrae before submitting to retroperitoneal pneumography. Therapeutic measures which are innocuous in comparison to their more precise diagnostic counterparts are often to be desired. The patient is better served even if the doctor is still unsatisfied.

Dr. Chandler in his Becker Memorial Lecture which is published in this Supplement says:

> Use of the word "disease" in its particular sense as contrasted with its general meaning as a process has a practical

value to the physician which may not be dismissed. In a restricted sense the expression "a disease" applied to a particular aggregation of symptoms and signs, often accompanied by characteristic structural changes in certain tissues and usually being an integrated response of the body to a specific exciting or precipitating cause. "Syndrome" is possibly a preferable term for designating these special aggregations of manifestations. Recognizing the existence of such "disease" is important because it may lead to well standardized programs of treatment whether their causes and treatment are understood or not.

However, an effort should be made to identify diseases by using all diagnostic aids that do not in themselves create a physical or emotional hazard potential of greater detriment than that for which they are invoked.

If it be granted that delay in arriving at a proper conclusion at times operates disastrously, it may be argued that the information gained in one way often equals that achieved with more risk.

In using therapy as a diagnostic tool, there is presumed a clinical judgment founded in acute observation and in the experience that can weigh it against more stylized means.

LEONARD V. STRONG, JR., D.O.

Physiological Integration as the Basis for Recovery From Disease and Its Osteopathic Implication

The A. D. Becker Memorial Address, 1949

LOUIS C. CHANDLER, A.M., D.O.
Los Angeles

During the months since I was requested to deliver this year's Memorial Address honoring our friend, Arthur D. Becker, before the American College of Osteopathic Internists, my thoughts have turned many times to the question of how to best fulfill this opportunity. An attempt to restate some of his philosophy concerning healing has grown into the following expression of ideas.

Another speaker has already told you of Dr. Becker's varied professional activities and attainments. Probably no member of our profession has served in more responsible capacities. Few men in the profession have been so much in demand as a participant in professional programs because of the sincerity and knowledge, dignity and culture that he reflected on the lecture platform. More than 20 years, he devoted to osteopathic teaching. With all his heavy involvement in organization and institutional responsibilities Dr. Becker remained at heart the physician and the maker of physicians. During 23 of his active years he was engaged in practice, first as a small town general practitioner, later as a consultant in internal medicine and cardiology.

But the nature of the man who served so generously concerns me more than the items of his service. Sometimes a man climbs to positions of prominence by an aggressive ambition which wins for him place and power but which arouses antagonisms that nullify his basic influence for good; others by their reckless drive, though wholly altruistic in motive, excite resistance to their efforts by the irritation they produce; others try to correct activities that to them seem wrong or unwise by criticism that kills cooperation through resentment. None of these was found in the way Arthur Becker administered his responsibility. In reading the numerous reports and recommendations that he submitted during his active years one finds them reflecting kindness and tolerance, patience and quiet counsel rather than exhortation and driving insistence. In studying his writings one is reminded of the subtle statement of the Chinese philosopher, Laotzu:

> A leader is best
> When people barely know that he exists
> Not so good when people obey and acclaim him
> Worse when they despise him . . .
> But of a good leader, who talks little,
> When his work is done, his aim fulfilled,
> They will all say, "We did this ourselves."[1]

It adds some understanding of the man's nature to know that the writings of Sir William Osler were his constant companion. Mrs. Becker writes to me that for years he carried in his billfold a clipping, reciting Osler's well-known statement of his personal ideals.[2] But a man's ideals and motives are not acquired from others through their words—they are always in and of the man though another's words may illumine or clarify or help in making vocal those already within. Kahlil Gibran[3] has said, "No man can reveal to you aught but that already lies half asleep in the dawning of your knowing."

It was not my privilege to have worked with and spent the hours with Arthur Becker that some of you had. On a few occasions, however, it was possible for me to talk with him intimately and learn of his attitude towards practice. One felt his rich confidence in life and his deep desire that all physicians might understand and build their care of the sick upon the principle of removing whatever obstructs Nature's spontaneous powers of repair and recovery.

THE HEALING PERSONALITY

This emphasis upon the character of the man we honor, and his philosophy, is deliberate. It has a closer bearing upon the topic of this address than may appear. Today we are coming again to understand, on scientific grounds, that the impersonal, technical approach to the disease which afflicts our patient is robbing him of the unperturbed confidence in life which is one of his most potent factors in recovery. Carl Binger[4] throughout his book, "The Doctor's Job," repeatedly refers to the integrity of spirit, the unwavering desire to bring help, and the essential humility in the presence of life that must go to make up "the healing personality." Without these inherent qualities the physician is limited in his ability to enable the patient to call upon deep seated restorative forces. He becomes the modern medical technician equipped with skill in diagnosis and in precise palliative treatment and substitutive therapy and with the ability to perform complicated repairs or to remove individual organs which have become irreparably

damaged. These are services of very great value in their proper places but *we do not yet know enough of pathogenetics and recovery to be able to decide certainly when damage to tissue has reached irreparable stages.*

Until the last few years it was generally believed and taught that malignant hypertension was inevitably irreversible. Now Page and Taylor[5] report that pyrogen therapy brings about the regression of the necrotizing arteriolitis on which the condition is based. Kempner[6] emphasizes that the important conclusion from his work is not that the rice diet may benefit malignant hypertension but that a supposedly irreparably damaged tissue may be completely repaired. Even more significant, Hench[7] writes that several years ago he came to the conclusion, from his observation of the complete, spontaneous recovery of advanced cases, that "within the patient who has even the severest rheumatoid arthritis powerful corrective forces lie dormant awaiting proper stimulation." Remote as it seems, one of the most dramatic announcements in recent medical history,[8] the effect of certain steroids in rheumatoid arthritis, demonstrates the seemingly miraculous powers of the body to reverse tissue change and refers us back, through other research[9] on the steroids and their relation to the adrenal cortex and the pituitary, to the importance of easing emotional strains and to the necessity of creating confident attitudes towards life's problems.

It is not always easy for physicians to keep alive the realization of the fullness of life, because so much of their time they are immersed in the problems of living things whose struggle for existence has been partially or completely lost. We can revive this feeling of the power inherent in the living by recalling illustrations from the simpler forms of life. We can remember the illustration of the seed lying dormant in the crevice of the rock. Bring it only sunlight and warmth and moisture, added to the food in a tiny bit of rock dust, and the growth of the sprouting seed, so long as its needs are supplied, continues irresistibly, to the point of splitting a great rock in two. It is practically impossible with any mechanical force available to suppress the mechanical expansion of the growing root. The growth can be stopped only by withdrawing one of the simple essentials that release and support the growth force.

The same principle operates at all levels of life. If each cell of each organ can be exposed to the physical and chemical influences appropriate to that cell, its functions will be spontaneously and sturdily performed. The complexities which confound us in our attempt to analyze the functioning of the higher animals comes from the confusing variety of cells and organs that occurs in the higher forms and the multiplicity of environmental factors, internal and external, which play upon them. The attitude which should calm and sustain every person and every physician at the imminence of disease may be found in the thought that within every cell, so long as it still lives and has not been structurally damaged, there resides the healing force which may be released by providing it with the normal conditions needed to let it survive and fulfill its functions according to its ancestral plan.

THE NATURE OF DISEASE

Living processes, however, do not always act beneficently, when judged by human values but may be molded by adverse environmental influences to adopt perverse behavior and to form distorted structure. Concretely, the physician is interested in disease and in aiding people to recover from disease. In order to proceed intelligently with this discussion we need to come to an agreement as to what the term "disease" shall mean to us and what is involved in the processes of recovery.

The word "disease" always has some meaning to us but that meaning will differ on varying occasions and with different people, so that a precise definition is difficult. In Dorland's "American Illustrated Medical Dictionary" we find disease defined as "In general, any departure from a state of health; an illness or a sickness. More specifically a definite morbid process having a characteristic train of symptoms. It may affect the whole body or any of its parts." This definition does fairly well but it gives us very little information of the nature of the process. Still less satisfactory are those definitions so frequently used which imply unpleasant or distressing sensations as characteristic of disease. We all know of cases of carcinoma of the stomach having reached advanced stages before the recognition of any discomfort or the discovery of any signs brought the patient to the physician's attention. Yet those patients were most definitely and grievously diseased.

Goldstein,[10] in his penetrating analysis of the nature of disease, introduces a helpful idea in the statement, "Being sick . . . is a disturbance in the course of life's processes . . . [which carries with it] impairment of and danger for the whole organism." He also suggests that the disturbance is an alteration of activity developed by the living organism as a response to an external influence. Seguin[11] describes very well the unfolding of man's concept of disease and the difficulty of ridding our speech of expressions such as "disease attacks," "the patient fights it," etc., expressions which imply that the disease is an exterior autonomous entity. Even Virchow and Freudian and current writers slip into this phraseology. The malignant potency of microbic organisms, invisible to the unaided eye, still arouses terror at times.

But the agencies are not the disease; they are the entities which excite the disease. What we see or feel and name the disease are the manifestations of the disturbed life processes excited by the cause. These disorders of activity may distress us or may destroy us in the effort of the body to nullify the cause. The aggregation of disturbed bodily activities which we name disease, and the course that they take, will vary with the magnitude of the exciting cause and the promptness, efficiency, and vigor with which the body mobilizes its resources. The disturbance may barely ripple the calm surface of the ebb and flow of unperceived physiological processes or it may grow to raging turmoil of agonizing symptoms and death. The exciting cause may be a chemical substance, an infectious organism, a physical stress or a social problem that threatens one's survival by threatening loss of the means of a livelihood.

The dynamic event called disease, in a living organism, we may summarize then as a state of activity developed as the result of some potentially harmful influence acting upon the organism, in which customary physiological processes are altered from their usual rate, intensity, or balance. This state of disturbed activity may cause discomfort or distress, may interfere with the effective performance of the organism's usual functions, or may threaten its survival,

in whole or in part, if the disturbance continues too long or too intensely.

Sometimes we call the static end result or pathological alteration of the structure of an organ or tissue by disease processes by the name "disease." It would be better to call this a "lesion," using the generic pathological term. The damage inflicted directly by external forces, as in a laceration, without the participation of body processes in producing the tissue alteration, likewise is not disease. A person may suffer damage from a burn. We admit that it does not seem right to call him sick or diseased, though he is suffering great distress and though the responding body mechanism may so fail to cope with the effects of the burn that he may die. But if his body was in poor condition from subnormal protein reserves and his response therefore was inadequate, he died because his tissues were deteriorated and he was diseased, though he was not aware of it.

The concept of disease is obviously full of subtleties. Only once, in studying the development of the idea that disease is a process of vital response to potentially noxious influences, have I found reference to the concept that the response may become manifest disease because the faculty of integrative responsiveness had been altered.[12] Nowhere outside of osteopathic writings do I find a clear recognition of the relation of this defective responsiveness to disturbed somatic structural relations. But the further we pursue it the more we are impressed with the essential thought that an alteration of the body processes is involved, leading to a state of body behavior not manifested under ordinary living conditions.

Moschcowitz[13] emphasizes the distinction between the terms "disease" and "diseases." He attempts to illustrate that frequently customary classifications of disease lead to confusion, rather than to understanding or to sound therapeutics, because of neglect to identify the basic pathogenesis. Naming, as though they were different diseases, pathological states that appear superficially to be different when they are in reality various stages of the same pathological process is illustrated. Polycythemia grows into myeloid leukemia, follicular lymphoblastoma into lymphatic leukemia. Says Moschcowitz, ". . . it would be just as consistent to classify the tadpole and the frog as different species [as to genetically separate polycythemia and myeloid leukemia] . . ." Current statistics [based on present-day naming of diseases] lose much of their significance, or even all of it, because the recording clinician did not note in what phase of the process the symptom or sign occurred." The newer work on the collagenous diseases and the steroids gives vivid evidence of the reorientation needed with reference to current medical thought and practice.

Use of the word "disease" in its particular sense as contrasted with its general meaning as a process has a definite practical value to the physician which may not be dismissed. In this restricted sense the expression " a disease" applies to a particular aggregation of symptoms and signs, often accompanied by characteristic structural changes in certain tissues and usually being an integrated response of the body to a specific exciting or precipitating cause. "Syndrome" is possibly a preferable term for designating these special aggregations of manifestations. Recognizing the existence of such "diseases" is important because it may lead to well standardized programs of treatment whether their causes and treatment are understood or not.

MULTIPLICITY OF BODY PROCESSES REQUIRING INTEGRATION

We have tried here to make it obvious that to understand disease we must think of it in terms of the body's processes integrated for a purpose. We need to regard the body as a going concern, containing within itself the mechanisms and structures and controls needed to maintain itself as an individual being, competent normally to protect itself against the potentially hurtful external influences that it contacts unless they exceed its racial experience too seriously. To build a mental picture for reference, we must call upon our imaginations to visualize the individual cells that go to make up muscle and gland, blood and nerve, and to regard them as animated entities, each one actively at work in a particular fashion; each one of the cooperating billions of citizens going to make up a world which we call a human body.

One means of illustrating the incessantly active life that is led by these cells and organs is to review the relation of oxygen to our lives. When we say that every cell must have oxygen to survive and carry on its work, the statement barely registers because it has been made such innumerable times. But if you will arouse your imaginations enough to create a mental picture of an individual voluntary muscle cell buried down in the depths of the gastrocnemius muscle in your calf, very remote from any possible direct access to the oxygen in the circumambient air, and ask yourselves how that cell is going to secure a supply of oxygen when it has a job to perform, a train of thought should commence that will be useful in our thinking. We have time to do little more than to list the substances, structures, and processes involved, with no attempt to describe their mutual interaction.

It is obvious that some agent will have to secure oxygen from the air and to carry it to the muscle cell. This carrier is, of course, the hemoglobin of the blood. It must act as a vehicle that can be used over and over again. The vehicle must be filled, moved to the point of delivery, unloaded, returned for refilling, and again moved on. The blood, the circulatory system, and the aeration system of the lungs are the immediate structures involved but describing the construction and the method of operation of each of these would require several hours.

The circulating blood held within the vascular tree by its content of protein, proteins that must be manufactured in proper amount by the liver and lymphatic system; the balanced electrolytes, regulated by the adrenal cortex and parathyroids and kidney, and the hydrogen ion concentration under proper control; the synthesis of the hemoglobin and formation of erythrocytes and the adjustment of their number in the body to long range requirements and to hour by hour demands; the regulation of oxygen interchange; the conveyance and elimination of carbon dioxide; the hormonal function of residual carbon dioxide in the right amounts upon the activity of the medullary respiratory and blood pressure regulating nerve centers; the energy releasing mechanisms in muscles and their dependence upon enzyme and vitamin action; the stimulation of adrenalin secretion and its sympathetic nervous system effect in reinforcing the processes of respiration and circulation and motor response; the heart, its operation and adjustment of the level of its activity to the needs of a more rapid circulation by

means of afferent nerve structures and coordinating nerve centers; the redistribution of the blood mass because of the greatly augmented demands of actively working muscle combined with the inadequacy of the existing blood mass to simultaneously supply all regions of the body with their working quotas; the filling of the lungs with fresh air and discharging it partially depleted, the muscles involved, their increased activity when more oxygen is needed and more carbon dioxide is produced, the influence of the breathing movements on hemopoietic activities; the activities of the nerve structures distributed throughout the entire central nervous system needed to coordinate and implement all of these activities and many others; the homeostatic controls that are constantly at work delicately adjusting the chemical composition of the fluid matrix in which the cells of our bodies live and have their being. Every process and activity mentioned, and many others, change the apparent even tenor of their ways, if you so much as rise from your chair, or, to a slighter degree, if you even think of doing so. And each change is suited to each other change to yield a merging of all, for the accomplishment of the total need, as intimate at last as the blending of streams of water joining as they flow to the ocean.

I have not any notion that I am bringing instruction to the members of the College in this mentioning of physiological details. Some of the younger members are better informed than I concerning their technical features. I am trying to revive your appreciation of the dependence of life not only upon multiple vital activities but upon the constant and coordinated regulation of these processes. I am endeavoring to enliven your minds for this hour to the reality of what Dr. Becker once referred to as "the ebb and flow of reflexes" in the composite of physiological processes necessary for survival, even for a moment.

HAZARDS OF FAILURE OF COORDINATION

We should next turn our attention to considering how easily environmental demands for adjustment may exceed the body's abilities and bring harm. The effect of hot and humid weather on the body will furnish an example.

When one is exposed to so much warmth and humidity that the body cannot properly dissipate its heat, the heat accumulates in the body and raises its temperature. This excites physiological responses directed toward offsetting this tendency. Blood will initially be diverted into the relaxed vessels of the skin away from the internal organs to allow increased radiation and convection of heat. Perspiration will be increased to provide heat loss through evaporation. Thus we have at the same time the need for a full volume of the circulating blood mass and loss of body fluids through perspiration, which tends to reduce blood volume.

In addition, heat brings a general depressed physical state, including relaxation of skeletal and abdominal muscles which thus fail to give their usual support to the walls of the veins of the abdomen and the large limb veins, allowing blood to accumulate in these locations. This makes it still more difficult to maintain a full peripheral and cerebral arterial tree. If the individual's blood-redistributing mechanisms are operating effectively a constriction of the blood vessels in the internal organs may take place sufficiently to balance the diversion of blood into the peripheral and venous structures and without too much lowering of blood pressure. If, in the attempt to maintain blood pressure, general vasoconstrictor action contracts the arteries of the internal organs and slows the blood flow through organs having diseased arteries, conditions for thrombosis are favored.

Reduction of coronary blood flow is especially likely to occur with splanchnic relaxation and active general arterial constriction. Added to these are adrenal factors, altered by fatigue, affecting the coagulatibility of the blood and the pH balance with its influence on cell permeability and endothelial adhesiveness. Many other body changes are taking place to complicate the situation. In a person with poor general physical condition and diminished adrenal and nervous reserves, an inappropriate resolution of these factors may result in poor coronary blood flow. If the individual has atheromatous coronaries, thrombosis and occlusion are possible consequences. Climatological studies indicate that the exhausting effect of weather conditions upon the homeostatic mechanism of heat regulation are a prominent precipitating factor in coronary thrombosis.[14]

UNIFIED RESPONSE OF ENTIRE BODY NEEDED TO COMBAT INFECTION

As an illustration of disease mechanisms involving an infectious cause, lobar pneumonia will serve well. Probably many men in this room have never seen a case of typical lobar pneumonia because they have never seen one treated without the use of chemotherapeutic or antibiotic agents. The operation of the exciting cause, the pneumococcus, is so greatly modified and weakened by these drugs that the whole clinical picture is changed because a different body response is called forth. In cases treated by osteopathic manipulation so as to augment the patient's response early in the infection there is a still different modification of the clinical picture from that of the old-fashioned case. Twenty years ago this disease presented an excellent illustration of the processes involved in the evolution of and recovery from an acute infectious disease. Even at that time the disease seldom appeared in the virulent form which was common 50 years ago. Some biologic adaptations, either on the part of the human body or of the micro-organism, seem to have taken place that have lessened the severity of the disease.

The process begins with some change in the host's body that permits the pneumococci, which have been lying dormant in the upper respiratory tract, to begin growing as weeds spread in a neglected field, down over the mucosa of the bronchial tubes and into the bronchioles to reach the pulmonary alveoli. The polysaccharide capsule of the pneumococcus contains an irritant substance which causes exudation of fluid into the interior of the alveoli and excites an inflammatory response leading to active congestion of the lung tissue.

From this point we will greatly condense the description of the process and try to keep separate the activities of the invading pneumococcus and those of the patient's body. To simplify matters let us assume that in our illustrative case, the pneumococcus does not itself penetrate beyond the lung tissue to enter the blood stream. The micro-organism multiplies and spreads through the lungs and covers the endothelial linings of large areas of the alveoli. The amount of bacterial capsular material increases as the number of bacteria increases and extends its irritant, exudate-producing effect through these lung areas. Products

of the pneumococcus cause fibrinous changes in the exudate in the alveoli rather than lytic effects on the tissue of the lung as certain other bacterial forms do. These changes seriously interfere with the aerating processes in the lungs. The cocci are phagocytized and dissolve, releasing an endotoxin which enters the blood stream and produces irritating effects on nerve and other tissues of the body. These bacterial activities continue until the antibacterial agencies of the body have increased in effectiveness to the point where they are able to check the bacterial multiplication. Bacterial involvement of new areas of the lungs is stopped, no additional amounts of endotoxin are formed, and the now fully mobilized forces of the body can go promptly to work to restore order.

As the pneumococcus rapidly went to work at the onset of the disease, because the body's usual defenses had been let down momentarily, the toxins which were released unbalanced the thermo-regulating nerve centers and the body went through the complicated activities necessary to produce a chill and fever to augment certain vital responses. The bacterial endotoxins excited the respiratory center to increased action even before the interference with aeration had become evident. Stimulation by the fever and the efforts of heavier breathing brought the heart and entire circulatory apparatus into increased action. All of the intricate processes recited previously in telling of the conveyance of oxygen were now called into action. But the regulating mechanisms this time had to deal with a new and difficult set of conditions. Oxygen absorption was being mechanically impeded; carbon dioxide was being produced in unusual quantities; the heart muscle was anoxemic and exposed to the toxemia of bacterial poisons and overloaded by increased pulmonary resistance. Even the functioning of the neurons in the regulatory nerve centers was altered by bacterial toxins; yet they had to continue their part in making the complicated readjustments of the many interdependent body processes.

Among other injuries caused by the circulating endotoxins was the damage to parenchymal cells in the glands on which certain phases of homeostasis are dependent, especially the adrenals, pituitary, and thyroid. This damage potentially could stop the production of immune substances and permit sudden advance of the infection to a fatal termination. Every cell of the body had a job to do under adverse conditions and to accomplish as rapidly as possible before it was too late to contribute to the over-all response. This had to be done without expending its own intracellular reserves irreparably. Oxygen supply to cells had to be maintained to prevent a self-consuming anaerobic cellular metabolism being substituted to provide cells with energy and function. Expendible reserves of protein had to be mobilized from the muscles and other less important tissues, in order to maintain the structure of essential organs and to manufacture immune globulins and to build armies of phagocytes. If the body was successful in its responses physiological turmoil was cleared within a matter of a few hours after the crisis and the patient was left depleted in energy and of surplus tissue. But a new set of activities immediately started. Leukocytes burrowed through almost solidified areas, dissolving away the fibrinous exudates. Damaged pulmonary endothelium regenerated. Vascular structures and supporting connective tissue were returned to their normal condition. The architecture of the lung tissue was restored with practically no residual damage—a marvelous performance of reconstruction.

I pause a moment for you to ponder this miracle. How is all of this maelstrom of activities organized and directed? We know considerable about each of fifty processes that are going on simultaneously. But who can comprehend how they are marshalled in exactly correct relationship to each other? Who knows enough to decide by his own reasoning that the fever should be depressed with an antipyretic or that slowing the heart would help or hinder the adjustment needed?

DIFFICULTY OF MAKING THERAPEUTIC DECISIONS

These days we are inclined to accept complacently the notion that the practice of medicine is rational and scientific; that so much is known that if we keep up to date we can figure out the answers in therapy. One is grateful to find a leader in medicine recognizing the difficulty of making therapeutic decisions as Thomas Addis[15] does in his recent book on kidney disease. Here he writes, "Quite properly, the actual treatment of patients is not usually the result of an explicit process of logical thought. In action the doctor should not have to find his way by a conscious process of inference. Whenever he is obliged to think, his purpose is endangered. For when he thinks, he will, like all other thinkers, surely make mistakes, and the errors, translated into action, may be disastrous. The patient trusts that his doctor knows, without thinking, what to do, and hopes that the prescription is not the outcome of the ratiocination of a single, fallible human being, but carries the signature of a great multitude of the scholars of disease and is validated by the accumulated experience of those who know and do not need to think."

It is rather disconcerting to our younger men to find a man of such standing leaning so strongly on empiricism and rather annoying to science teachers. Yet the more mature a physician becomes the more he uses so-called scientific methods only as an adjunct to the knowledge that comes from experience. The need of balancing science and empiricism in practice is suggested by Addis, but let us note that the limited value of rationalization based on scientific information comes from the tremendous complexity of the living processes in the organism and the incomprehensible difficulties of integrating them.

In a similar vein our brilliant lecturer, the late Harry W. Forbes, was asked one day from the Convention floor what manipulation would lower the heart rate in pneumonia. In effect he answered: "I would not know whether the heart rate should be lowered or raised in a given case of pneumonia. Nature has been making such decisions for us for several million years. I will take care of the structural deviations that I find and let nature decide what to do about the heart rate."

I had not intended to discuss treatment so much at this point but maybe it is appropriate. The incident that led to this turn of thought was a comment made to me a short time ago by an intern in the hospital. "A prominent osteopathic physician told me," he said, "that antibiotics are only an adjunct in the treatment of pneumonia. I couldn't take that."

If the intern's comment had reflected only a protest against the idea that penicillin was unimportant, I should not have been disturbed. It was his preoccupation with the idea that the penicillin was directly involved in the cure of the disease rather than only restraining an external cause. It was his ignoring the

fact that the patient's body still had to destroy the pneumococcus, that the penicillin only held the organism in check and that the patient's body still had to manufacture the necessary antibacterial substances and perform all of the task of repairing what damage had been already produced. Precisely speaking, penicillin is a mere adjunct to the body's elaborate mechanisms of resistance and it renders no other aid. Clear thinking requires such distinctions to prevent inaccurate analysis of our problems. We are devoutly thankful that penicillin and the other antibiotics to help control serious bacterial invaders have been made available to us through the efforts of bacteriologists and mycologists and chemists and pathologists even more than physicians. But if we settle back in smug pride at what we can do with them we are likely to overlook the fact that wrongly used they will fail us; that in time, adaptive changes in the resistance of the pneumococcus to the drug will almost surely develop an invader that penicillin will not inhibit. This recognition of the accessory nature of antibiotic effects and the possibility of defeating our ends if care is not used to prevent the development of drug-resistant strains is clearly emphasized by allopathic writers.[16,17]

I fear that I may have labored too long over this emphasis on the marvels and mysteries of the body's processes. But I am encouraged to go further with this line of thought. Max Planck,[18] Nobel prize winner in physics and author of the revolutionizing quantum theory of energy recently wrote, "The reason why the adult no longer wonders [as does a child] is not because he has solved the riddle of life, but because he has grown accustomed to the laws governing his world picture . . . . he who has reached the stage where he no longer wonders about anything, merely demonstrates that he has lost the art of reflective reasoning." I trust that those in this group are still able to feel wonder without thinking they are too sentimental and that they are still willing to exercise their powers of reflective reasoning.

PHYSICAL BASIS FOR COORDINATING ACTIVITIES

So far I have tried particularly to revive your recollection of the great complexity of the living processes exhibited by the body in counteracting disease-producing influences and in getting itself restored to a state of health after the turmoil involved. I have emphasized the existence of a unifying principle which is at work continually in maintaining the coordination of scores of individual processes for the purpose of securing the individual's survival. An attempt to identify this principle or the source of the decisions involved in the unifying process is beyond our ability at this time. I have briefly referred to the concept of homeostasis accomplished through combined neural and humoral agencies, so ably developed by Cannon,[19,20] but I have chosen to omit any effort to elaborate the phenomena referred to. We know that a large part of the integrative activities is accomplished through the nervous system, as first described in a comprehensive way by Sherrington.[21] We know considerable about the construction of the nervous system, and how it operates in its participation in the processes of integration. The important fact is that integration is so largely carried on through identifiable physical structures. This knowledge has practical applications that I must try to indicate. I will briefly illustrate this point by reference to the control of the somatic activities by which we relate ourselves to our environment.

We are all familiar with the structure of the spinal cord. Let us visualize the groups of large multipolar cells located in the anterior horn of the spinal cord, whose axons stream out in the motor nerves, for example, to the biceps muscle. Those cells do not initiate their own action but send out nerve impulses only when they are excited by impulses reaching them by way of their dendrites. These receive impulses from the branches of axons coming down from cells of the motor cortex and other higher centers for the performance of complicated voluntary movements and collaterals of axons from afferent sensory cells by which impulses arrive which are initiated in skin and ligament and joint surfaces to provide for simple segmental reflex actions. Korr[22] has presented an interesting statement from an osteopathic standpoint of the basic anatomical and physiological facts concerning the individual spinal segment.

Supposing we enlarge our picture and think of what is involved in an action such as jerking the arm away from contact with a hot object. In this case most of the muscles of the arm and shoulder girdle, at least, must participate. To operate all of these muscles involves the activity of groups of multipolar anterior horn cells distributed in the gray matter of the cord all the way from the lower dorsal to the upper cervical spinal areas. All of these cells must come into action properly timed to a hundredth of a second in reference to each other to make the muscles move in proper sequence and balance of force so that the complicated movements involved are skillfully and smoothly performed. To accomplish this the groups of motor cells in the anterior horn must be integrated in their action by hundreds of thousands of association cells which are distributed through the gray matter of the spinal cord. Segmental divisions are largely ignored, however, and the cord acts almost as one continuous whole. The actions of all of these correlated myriads of cells may be excited by one sufficiently strong stimulus coming in over one, or at most a very few, sensory fibers connected with the point of injury. The necessary timing and sequence of the muscular activities involved in these coordinated movements is accomplished by interneurons controlled by impulses streaming down from nerve cells which lie in the pons varolii and higher centers. Descending fiber bundles and their collaterals make connections with groups of anterior horn cells and their association cells and set the threshold of responsiveness in patterns or mosaics. The cells in one mosaic are touched off as a unit by the proper stimulus, crudely similar to the manner in which a single fuse may touch off the lighting up of the complicated pattern of a picture in fireworks.

It may make the idea of the physical reality of these mechanisms more vivid to refer to the similarity between electronic machines and our brains and spinal cords. Two excellent popular articles have appeared recently describing some electronic machine activities that have a counterpart in the functioning of the human nervous system.[23,24] Here we find the nerve cell bodies described as vacuum tubes through which impulses are relayed as electrons flow through the tubes of a radio circuit. The metabolic battery within each nerve cell body keeps its cell membrane positively charged one-tenth of a volt relative to its interior, until it is stimulated to discharge. Its discharge is excited by impulses that reach the neuron from other neurons. Some large cells have terminations upon them from thousands of other neurons and the activity in

each termination contributes its plus or minus in determining whether the neuron shall "fire" at a particular instant. They are compared to vacuum tubes made with thousands of grids to control their action instead of from one to five as in radio tubes. They are "hooked up" variously like tubes in a radio or electronic calculating machine with regenerative closed circuits that form the basis of one kind of memory; with current "feedbacks" that regulate functional activity as the automatic volume control of a radio does; with circuits in parallel that serve as automatic checks upon each other's accuracy and protect against error in some cases, or function in substitution for each other in others. Enough is known of these electrical phenomena in the brain to be able to calculate from brain circuit constants the speed of travel of nerve impulses and the possible range of frequency of discharge from neurons. The answers found correspond to the figures which are determined by laboratory physiological experiment. Electrical phenomena known to occur explain the obliteration of memories by electric shock therapy and their regeneration; the pathologically fixed neural behavior in neuroses which correspond to the "howl" in a regenerative radio circuit when a few tubes get out of balance. Modification of electrical behavior by changing chemical states makes obvious the possibility of distortion of neural function by chemical influences, disturbing ion balance, changing pH concentration, and varying the state of oxidation, as well as by foreign chemical substances. Recognizing the incomprehensibly great number of electrical units in the central nervous system of man and the overwhelming complexity of their interrelation awes the reader as he studies this new work on electric calculating machines as compared with brains. But the fact becomes more vividly clear that the brain operates through physical structures and in strict accordance to a relatively few physical laws.

When sets of electron vacuum tube relays are so constructed that they integrate the complicated operations of machines when they are set in action, engineers call them servomechanisms. Louisa Burns has referred to such groups of interrelated neuron structures as robots. For several decades they were referred to by physiologists as "nerve centers," a term with which we are all familiar. In her works[25] Burns describes a large number of these structures and their organization. The location of the neuron cell bodies, the origin of the sensory influences that affect them, and the distribution of the axones arising from them are described. Neuron mechanisms are described which control respiration, swallowing, coughing, defecation, micturition, the maintenance of blood pressure, etc., and which provide for their adjustment to the body's needs. Though written in 1911 the descriptions still give one a remarkably helpful foundation for understanding the regulation of body operations and they need relatively little modification to bring them up to date.

One thing of great significance may be emphasized for its osteopathic significance. This should always be remembered: These living servomechanisms, which they are, each utilize many scattered spinal segments. The hyperirritability of a particular single segment, from an osteopathic lesion, for example, will not necessarily increase or decrease the activity of a particular function. It will rather distort the smooth performance of the function insofar as that segment's activity contributes to the whole. For example, one muscle alone out of twenty needed to accomplish some movement may be disturbed and so make the movement as a whole more awkwardly accomplished. We must be careful not to oversimplify our ideas on these matters. Only certain very simple functions, though they may be important, are accomplished by one segment alone. The idea of the existence and importance of the physical basis of integration for living is more emphasized by each addition to our knowledge.

Nielsen and Thompson[26] have interestingly developed the same idea in their 1947 book, "Engrammes of Psychiatry," in which they describe the numerous physically related groupings of cells. Each grouping acts as though it had a separate existence for the performance of a special activity at the order of some higher direction. Some are developed to function at the time of birth, such as those for crying, suckling, swallowing, performing the movements of evacuating the bowels, turning the head and eyes in response to light and sound. Others develop later, as those for swallowing of solid food, standing, laughing, walking, fighting, talking, performing movements of deception to escape danger, etc. Those developing after birth do not show such stereotyped action and allow for individualization of behavior to meet special environmental needs. These engrammes are utilized by the individual to carry out the innumerable complex activities that are necessary for him to survive.

By the term "engramme" Nielson and Thompson are referring to a physical reality but not to a mere group of nerve cells collected in a particular area. They have in mind a grouping in the sense of their being functionally related to each other. Neurons in scattered locations are tied together by specialized nerve pathways to provide the coordination of the many muscles used in swallowing, for example. In suckling, some of these same muscles will have to be utilized, some will not be needed, and some others not necessary before will have to be called on. The neurons involved this time will include some of those used before but they will be connected up differently. The engramme, in each case, will lie in the patterned molecular arrangement that is developed in the cells and fibrils and synaptic areas which are linked together to bring the proper muscles into coordinated action.

DISTORTION OF INTEGRATIVE PROCESSES BY PHYSICAL DAMAGE WHICH AFFECTS NEURAL STRUCTURES

The importance of this concept is that since there is a material basis for these activities, a physical damage to any of the units either cell or fiber or synaptic area, entering into the make-up of such an engramme, can cause distortion of its activity and thus alter behavior whether of muscle, gland, or personality. Dr. Burns'[27] experimental work has demonstrated that spinal lesions in the occipitoatlantal and upper cervical areas produce definite nerve cell damage and other tissue alterations in various areas of the brain, hypothalmus, pituitary, and medulla. These she describes in detail and then continues,

> . . . Robot-like nervous structures are here housed which perform many complicated services for persons. . . . Normal rabbits and guinea pigs show a definite behavior pattern. They eat, keep themselves clean, react to environmental changes, prepare for their young, and void excrement and urine in a manner which is fairly uniform for the age of the individual and for the species.
>
> Animals with an atlas lesion, especially, and in some degrees with other cervical and certain thoracic lesions, do not show this distinctive behavior pattern. They eat more food

and they waste food quite conspicuously. They slop the water and often climb into it even though the water containers are so made that it is difficult for them to get their feet into the drinking water. They do not keep themselves clean. The fur may be matted with fecal or urinary contamination. They react excessively to environmental changes and are seriously excited by any slight noise or disturbance. Diarrhea often follows relatively slight excitement of any kind. They void urine and excrement in unusual places with little care to avoid befouling their own fur or sleeping place, or their food or water.

A moment's thought will make one realize that these changes have so altered the behavior of the experimental rabbits that their survival is seriously threatened. It is to be recognized particularly that patchy histological damage does not specifically suppress the activities of "centers" or "engrammes." *It distorts them.* The thesis of Nielsen and Thompson's book is the same that Burns emphasized over 35 years earlier: that alterations of behavior and of mentality have a material basis. The same thing is true, though less obvious than when a change of external behavior is caused, that similar histological damage in the areas which control vasomotor responses, cardiac function, gastrointestinal behavior, and other of the visceral activities, will also cause distorted visceral function.

We may think of a large electronic calculating machine in which the pathway of electrical flow taken through the instrument is determined by the balancing of the electrical potentials in the possible circuits. A bit of metal filing getting into the device may produce a short circuit which disturbs the automatic selection of pathways so that the wrong "answer" is given. Neuron pools act in a very similar way.

RESEARCH INDICATING THAT OSTEOPATHIC LESIONS DISTURB NEURAL REGULATION IN THE BODY

Osteopathic research by several workers during the past 40 years has demonstrated many facts that have significance regarding these possibilities. Unfortunately, reports of this work have never been collected and compiled and interpreted adequately. For many years Louisa Burns'[28,29,30] research has been devoted largely to studying the effects of a particular type of spinal joint displacement upon the circulatory and cellular changes in areas of central nervous system tissue related to the lesion and upon the functioning of corresponding viscera. For example, disturbing effects on myocardial nutrition and circulatory regulation, sometimes very serious, have been demonstrated in many scores of her experiments. Wilbur Cole[31,32,33] is at present engaged in continuing experimental work of a similar nature and has already published some of his findings.

Denslow,[34] supplied with modern scientific facilities, undertook to study the behavior of the spinal muscles by electromyography with measured mechanical stimulation. His results indicate that there is a change in the behavior of the neuron pools in the spinal cord segments which are related to spinal column areas where palpable changes, which we have called osteopathic lesions, are found. He demonstrated that mechanical stimulation of normal areas of the spine can excite abnormal neuron responses in a lesioned area several segments away.[35] During this work many curious perversions of behavior of the spinal muscles were noted in lesioned areas,[36] and evidence was observed of unnatural capillary fragility in the corresponding areas, reminiscent of the occurrence of capillary hemorrhages in nerve and visceral tissue which was observed by Burns so uniformly in her experimental lesioning of animals. Korr[37] supplementing Denslow's work, has investigated the relation between areas that present osteopathic spinal lesions and vegetative responses in corresponding areas. He has demonstrated significant disturbance of vasomotor and sweat gland control both in areas of osteopathic lesions and in stress points from postural imbalance. Alteration of visceral function is now being studied in his laboratory. Physicians of the allopathic school of medicine report clinical experiences which give evidence of such viscerosomatic relation. A few illustrations are supplied by the distressing "shoulder-hand syndrome" of vasomotor disturbance,[38] cases diagnosed as intermittent claudication,[39] and improvement of visceral function from anesthetizing "trigger points."[40] The restoration of function in apparently complete postpoliomyelitis paralysis within a few hours or a few days by the Kenny technic demonstrates the strength of disturbed neural factors in influencing efferent pathways.[41]

We cannot say at the present time how much the disruption of the integrations concerned in protecting us from infectious disease may be due to distorted neuron activity throughout the central nervous system. Insofar as this integration is vital to resistance, osteopathic lesions become important. The work of Speransky[42] presents a mass of elaborate data which have not yet been adequately coordinated or interpreted but which, nevertheless, indicates that the nervous system is intimately and powerfully involved in bringing into integrated action all of the tissue and humoral responses necessary for resistance to infection, recovery, and repair. Speransky[42] comments: "It is terrifying to think what would have happened to physiology if, in the processes studied, nervous influences [had been] ignored as persistently as they have been until recently in pathology."

ABILITY OF THE ORGANISM TO REPLACE DESTROYED NEURAL FUNCTIONS

While I do not wish to distract attention from the practical importance of the mechanisms of integration, I cannot leave this attempt to explain disease processes and the possibilities of recovery without reference to a group of phenomena which are often overlooked. This relates to the fact that organisms so often display the ability to survive even after the destruction of certain component parts which are usually thought to be indispensable. It seems as though an inner urge, in living things, makes it possible for them to rebuild material structures to a degree that we usually do not recognize. Shephard Franz[43] demonstrated this when he showed that, after the destruction of one part of the brain, an animal is often capable of taking over and utilizing new areas for purposes for which they were not originally developed, thus replacing the lost function. He illustrates this by referring to the setting up of indirect telephonic connections for cities isolated by disaster when the direct connections have been destroyed. What this power is whereby a new pathway can be built up within the nervous system we cannot explain satisfactorily. Some of the most dramatic of these possibilities are shown by the work of the Berry Institute in cases of long-standing paralysis.[44] Recovery of muscular power has been accomplished after months of care during which the patient visualized and, for hours a day, day after day, endeavored to will the action of muscles in which there was no power.

Ultimately, it seems, "the will" succeeded in driving new nerve pathways through. Such remarkable recoveries are unusual not because the ability to accomplish them is absent in most individuals. The power to utilize life's processes to secure such recoveries is inherent in the nature of the organism, ready to respond if proper motivation is supplied.

A study of Goldstein[45] and of Driesch[46] will add much to the physician's understanding of such recovery, but the principles involved are too subtle to consider while we are chiefly concerned with emphasis on the physical structures involved in disease and recovery.

QUESTIONED THEORIES CONCERNING OSTEOPATHIC LESIONS

I am sure that you have recognized some osteopathic implications in the scientific findings that have been recited. Careful attention to what has been said will help us to understand many of the confusing ideas that exist in the osteopathic profession concerning our mode of practice. One difficulty in assigning osteopathy to its proper place arises from the unpredictable and the innumerable possibilities that conceivably may result from such an etiologic factor as the Still osteopathic lesion. This is due to three, or more, facts. There is, first, some variability between individuals in the construction and internal connections of their nervous systems. Again, as Denslow has shown, there is the possibility that abnormal excitatory responses may be produced in segments remote from the one stimulated because of the elaborate intersegmental connections. Finally, a spinal osteopathic lesion does not affect in the same manner all of the nerve fibers in a given spinal sensory nerve, just as in a cable of telephone wires, only a few may be broken in some accident. The consequences of a given lesion will be affected by the particular individual afferent nerve fibers that chance to be disturbed by the lesion and the destination of the impulses carried in these fibers within the central nervous system. If the disturbance of function or structure that results in some elaborate aggregation of nerve cells which governs a particular function affects an important spot in the robot-like mechanisms which we have described, the resulting distortion of function may be serious. In another case it may affect an unimportant point in the cell aggregation and cause no significant harm. Neither does the severity of the lesion in the spinal column definitely determine the visceral results. Always this is governed by the neural structures that chance to be affected.

Osteopathy's original popularity came from the fact that it sometimes produced astounding cures in cases where allopathic treatment had failed. The osteopathic profession has lost some of its enthusiasm for manipulative treatment because such results cannot always be procured by a certain type of treatment. The profession early built up a very fallacious idea that there were particular spots in the spinal column where lesions uniformly caused specific disease problems. This is only very crudely true, but it is true often enough to justify fully the clinicians of that day for reaching such conclusions because so little was known concerning the complexities of the nervous system. With what we know now we can understand that an osteopathic lesion may *disturb* physiological functions in varying ways and alter their stability and the precision with which they respond to varying conditions. They more often distort functional responses rather than arouse or inhibit them. According to my understanding it was not Dr. Still's intent, when he spoke of specific treatment, to imply treating uniformly a certain spinal area for a particular disease. What he was insisting on was the specific treatment of the specific area where structural deviation was found upon examination—"Find it, fix it, and let it alone." In fact, if you study Dr. Still's writings you will find that while he referred frequently to the fact that lesions in certain areas were found usually in the same disease, he emphasized continually the need of examining the entire spine and, for that matter, the entire skeleton and fascial system and all of the structures of the body and giving treatment where indicated.

Another fallacy of osteopathic reasoning in some of our efforts to explain clinical claims scientifically was indicated by the attempt to demonstrate experimentally that certain functional disturbances could be initiated by stimulating certain segments by manipulation. This often failed to lead to significant findings because it ignored the tendency of the body always to neutralize adverse influences unless they are so potent that they destroy or overbalance the stabilizing processes that are constantly at work. These studies failed to recognize the well-established principle of pharmacology that a small amount of a drug will often produce strong responses, with a trend toward normal, when functional perversion is present initially. This is illustrated by the antipyretic drugs where almost no lowering of temperature is produced in a patient who is in a state of health. Manipulative work similarly is most likely to cause its most potent effects not when applied to a normal spine but to a spinal area that is disturbed. We should note, too, that these more potent effects of manipulation are not always beneficent and that we are often unable to anticipate what the result of osteopathic manipulative treatment will be. Too much still seems to be in the realm of uncertainty, both as to what will result from manipulation in the area of spinal vertebral lesion and in the physiological consequences.

OVEREMPHASIS ON SCIENTIFIC TECHNICALITIES PREVENTS SOUND CLINICAL INTERPRETATIONS

These uncertainties constitute great obstacles to many scientifically trained men in maintaining an interest in osteopathy. Uncertainty regarding an observation to them means that it probably is not valid. An answer reached by the objective method of physical science is demanded. Physical science is so dominant in their thinking that they fail to realize its limitations when dealing with the problem of the living. This attitude needs to be carefully scrutinized.

Many scientific leaders are concerning themselves with this problem. For example, Alan Gregg,[47] Director of Medical Sciences for the Rockefeller Foundation, says,

> . . . to regard a malady as an intellectual puzzle, provides the physician with such an absorbing task that he commits the commonest error of the scientific mind; he forgets . . . some important variables in the equation he is attempting to solve . . . . Science provides us with instruments of such entrancing accuracy, with oil emersion lenses and potentiometers and spectrographs and x-rays, all of which are superbly efficient for seeing parts of the total picture . . . . they make it seductively easy to *look at something* merely because it can be seen. . . . If an instrument of precision will automatically register, measure, and record a singularly active and colorful "dicky bird," we may be giving all our attention to what is no better than a "dicky bird" for all of its beautiful verifiability.

This kind of diagnostic study has such a fascination for most men trained in the sciences that they fail to give attention to the indispensable clinical observations that cannot now, and possibly never will, be analyzed with instruments. Gregg emphasizes strongly the need for study of the principles of clinical reasoning. Ackernecht's[48] tracing of the problem of balancing objective study and philosophical analysis in medicine, as it has recurred through the ages, will help the student to understand the perpetual dilemma of being scientific and a true physician at the same time. At present, much of our confusion lies in not distinguishing between what is valuable in clinical research and what is helpful in caring for the individual patient.

There is a deeper problem, however, that we must recognize. Too many people, including physicians, have developed the notion that the material sciences have clarified our problems. Many scientific leaders are deeply concerned over the failure of people to realize the dangers that come from such misconceptions. For example, Edmund W. Sinnott,[49] Director of the Sheffield Scientific School at Yale University, elaborates the inadequacies of material science to give a satisfactory understanding of life. He points out that while biologists are beginning to experience the delight of being able to deal with life in the precise terms of physics and chemistry, the physical scientists "are far less certain of the validity of the naive materialism of a generation ago. . . . Whether we like to admit it or not, things are more mysterious than they used to be, a century of science notwithstanding. . . . The ways in which the [advanced] scientist and poet work are very similar, as [the physiologist] Dr. Cannon has shown in his delightful essay on the role of intuition in research." Charles A. Lindbergh[50] has recently written, "Somehow man must be made to see that science was hypnotizing him with its machines, dulling his senses with its knowledge. . . . In worshiping science man gains power but loses the quality of life. . . . Modern civilization could not live without science. . . . but if his civilization is to continue, modern man must direct the material power of his science by the spiritual truths of his God."

"Reverence for life," the theme running through the whole life work and writings of Albert Schweitzer, the world famous physician-philosopher, gives the key to the attitude that we should hold as we try to see straight some facts about the osteopathic profession and osteopathic practice.

THE ATTITUDE OF THE OSTEOPATHIC PHYSICIAN TOWARD HIS PRACTICE

Conducting a practice that conforms to osteopathic principles and utilizes the manipulative measures which they indicate places the physician in a relation to his patient that is very different from that of either the modern scientific specialist or the prehistoric "medicine man." The osteopathic physician is not set apart from or above his patient by impressive gadgetry that makes him appear awesomely learned or mysteriously endowed. To practice as an osteopathic physician requires an inner attitude of humility and of reverence for the living forces that sustain his efforts. In a peculiar degree, he must rely upon his own self-respect and personal integrity. Much of what structural correction accomplishes merely makes it possible for natural processes to commence their reconstructive and corrective activity. The benefits are often so remote that both the physician and the patient may fail to give credit to the osteopathic work. This makes it very difficult to appreciate how great the benefits of structural corrective treatment may have been. Our discussion today has endeavored to give a basis in reality for accepting the beneficent possibilities of osteopathy.

One of the obstacles to getting members of the osteopathic profession to give their attention to the long range values of osteopathic structural therapy is that there is a certain group of cases where results are obvious and immediate. This is true, at times, in lumbagos, in cardiac arrhythmias, and intercostal neuralgias that simulate pleurisy. Many of the profession think of such an application of osteopathy as constituting its scope. Conversely, certain medicinal treatments and surgery are sometimes undeniably and immediately life-saving, or are indispensable to prolonging life, but there is also a great mass of such practice currently accepted that is purely symptomatic and does not in the least correct the underlying pathological state or prolong life. Contradictorily, much osteopathic manipulative treatment is beneficial without being spectacular while much approved drug treatment gives spectacular relief without being fundamentally beneficial. Unprejudiced and comprehensive consideration of the relative merits of osteopathic structural management and the technical medical approach is needed to judge which will give the patient the greater good.

EMPIRICAL INDICATIONS OF BENEFIT FROM OSTEOPATHIC STRUCTURAL THERAPY BY IMPROVED INTEGRATION

No one knows, unfortunately, how often osteopathic structural correction may be the determining influence in illness. Still less does anyone know how frequently the balance is so close between adequate resistance to infection and failure to resist that a slight improvement in the integration of the body's myriad activities will determine the issue. Those who have practiced skillfully as osteopathic physicians have seen advancing critical illness, both acute and chronic, turned toward recovery by osteopathic treatment. They have seen large clienteles go through serious epidemics of infectious disease with a strikingly lower incidence of the epidemic disease than the general population suffered. It seemed certain that the better marshalling of life's inherent powers in persons having osteopathic care gave them protection that others did not have. The effect of maintaining structural normality in preventing degenerative diseases is most difficult to measure but many of us are empirically convinced that it has great value. It is most unfortunate that many members of the profession, in these accomplishments, have not given adequate attention to the distinction between the effects of skillful structural correction and so-called "general treatment" that Dr. Still called "engine wiping." Determining how to give precise treatment so as to have the greatest value with the least "manual labor" and waste of the physician's time would add greatly to the community service that the osteopathic profession could render.

To measure these potentialities of osteopathic procedure and to develop the technics of applying them will require prolonged and complicated scientific studies that will need the best minds and special training. Few of us have the qualifications necessary to comprehend fully the subtle intangibles involved in these studies and all of us are too busy with the daily

details of caring for patients to think much of making contributions to scientific progress through our personal participation. But as the internists of the osteopathic profession, we are in a unique position to give aid to those who are engaged in trying to advance knowledge concerning the application of these principles, by cooperating with and supporting in every way possible the profession's program of research into these challenging problems.

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THE SCIENTIFIC APPROACH TO ORTHOPAEDIC SURGERY

. . . We must give more attention to research in all its forms: clinical observation; experiment in man; and experiment in animals. Some years ago Wilfred Trotter pointed out that clinical observation, except in the hands of an occasional genius, had not been a very effective instrument by which to penetrate the fundamental secrets of health and disease, but that nevertheless it could be an important instrument for assessing the results of treatment if it was recognized, not as a spare time hobby to be indulged in when a paper was to be written, but as work which must be done constantly. It may be felt that, for such clinical observation, much time must be given; and that in our overworked state this is not possible. There is much truth in this. But the difficulty could be overcome if sufficient men of the right calibre—those who had reached the senior registrar or assistant surgeon status, having first gained some knowledge of statistics—were available to collect cases and assess treatment as part of their normal work. I do not think that many men, except occasionally and for a limited period, should devote their whole time to this type of research, but it should be one of their duties, at least in the early stage of their careers. The work of one man, dealing with a particular problem, should not necessarily be confined to one unit or centre; if it were not so confined the same judgment could be applied to comparable groups of cases treated by different methods. It would be possible in these circumstances for a man—if his mind were acute enough—by assessing the results of different types of treatment to find out what really was essential in each, thus at the same time advancing knowledge and simplifying treatment. He might also, by carefully assessing symptoms, deduce their real causes. Clinical observation, properly organized and conducted, could yield a rich harvest.—S. Alan S. Malkin, *The Journal of Bone and Joint Surgery*, February, 1949.

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The Carotid Sinus Syndrome

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It has been 150 years since Parry[1] demonstrated a decrease in the heart rate caused by external pressure upon the carotid artery in man. Since that first clinical description of the phenomenon, there has been a great deal of investigation in connection with the causes of bradycardia as well as numerous writings attempting to clarify the finely balanced mechanism influencing heart rate.

About 70 years after Parry's discovery Czermack[1] called what is now known as the carotid sinus reflex, the vagus-compression reflex. At that time, 1868, there remained much to be learned about neurovascular physiology and pathology. There was in those earlier years, the question of vagus stimulation being the responsible factor in slowing the heart. Today physiologists state with quite a degree of assurance that stimulation of the vagus, even surgically, as during operations on the neck, has little effect on the heart rate.

Sollmann and Brown[2] in 1912 did considerable animal experimentation on sectioning of the carotid arteries and vagus nerves and found that the carotid sinus played a most important role in governing the cardiac rate and in addition noted the effects of stimulation of this structure in the control of blood pressure. The findings of these two men were closely correlated with the observations made by Hering[3] in 1923. This correlation leads to the conclusion that in all of the earlier experiments, it is more likely that stimulation of the carotid sinus initiated a reflex producing neurovascular changes, rather than that they resulted from direct vagal influence.

The basic factors of the carotid sinus reflex are fairly well known but, because of the lack of knowledge pertaining to the complete innervation of the carotid sinus, there is still some disagreement as to all of the physiological processes involved. At present, this subject is receiving prominent attention in the neurosurgical clinics, especially in the midwestern and eastern schools.

The carotid sinus is a bulblike enlargement situated at the bifurcation of the common carotid artery. It has been shown to be present in infants but not in the fetus; it is present in many animals. The wall of the sinus is thinner than the wall of the other parts of the artery. The tunica interna of the sinus is about the same as the tunica interna of the rest of the vessel; the tunica media is thinner while the tunica adventitia is thicker in the sinus portion. The adventitia contains numerous nerve cells or receptors which are extremely sensitive to irritative stimuli. These cells terminate into delicate menisci which emerge from the sinus to make up the sinus nerve which is sometimes called the sinus nerve of Hering. This nerve ascends between the internal and external carotid arteries, joining mainly the glossopharyngeal nerve.

Other nerves supplying the carotid sinus include a filament from the superior cervical ganglion of the sympathetic system, the vagus, and some branches from the hypoglossal nerve. There is also a connection from the carotid body which is a small structure on a branch of the occipital artery or a small vessel arising directly from the carotid artery. It is found in close proximity to the carotid sinus and contains chromaffin cells and chemoreceptors.

It may be well to mention at this point the aortic body which lies in the thorax between the pulmonary artery and the ascending aorta. According to Wright[4] the carotid and aortic bodies function as chemoreceptors, sampling changes in the chemical composition of the blood. They are affected by alternations in carbon dioxide and oxygen tension, hydrogen-ion concentration, and certain drugs like nicotine, cyanide, and acetylcholine. The different impulses arising in these bodies reflexly modify respiration, vasomotor control, and heart rate. Centrally the fibers of the sinus nerve are connected with cardioinhibitory and vasomotor centers.[5]

When pressure is made upon the carotid sinus, the reflex is initiated and heart rate will decrease. Vasodilation takes place and a fall in blood pressure ensues. This reaction occurs by the use of mechanical pressure at the site of the sinus for from 10 to 30 seconds. Electrical stimulation will produce the same type of reflex. If pressure is exerted a short distance below the sinus, so as to decrease the pressure within it, general arterial pressure rises, cardiac rate increases, and liberation of epinephrine is intensified. It is likely that the slowing of the heart is caused by reflex stimulation of the efferent vagal cardioinhibitory fibers. Conversely, when pressure is increased within the sinus, the opposite effect occurs, for example, decreased heart rate. A decrease in skeletal muscle tone may occur when pressure is increased in the sinus, but this is not a certainty. Some individuals who are taking digitalis seem to have a hypersensitive carotid sinus, but the exact mechanism of this alteration is still obscure.

It is difficult to explain why some individuals have a sensitive carotid sinus and some do not. It is well known, however, that patients having hypertension and arteriosclerosis have an especially sensitive group of receptor cells in the sinus. This type of patient is middle-aged or elderly, the average age being about 55 years and the ratio of males to females is about 5 to 1. In arteriosclerotic individuals, marked slowing is noted after carotid sinus compression.[6] This mechanism is probably brought about because the sensory endings are pressed against the hardened media.

Only a small proportion of patients with a hyperactive carotid sinus reflex exhibit manifestations of the carotid sinus syndrome. Those in the asymptomatic group seem to have a sensitive cardioinhibitory carotid sinus reflex, but the sensory receptors in the adventitia are not effectively stimulated. Consequently clinical symptoms are absent. It is likely that the ease with which impulses are transmitted to the adventitial receptors depends chiefly on the structure of the sinus.

Syncope, brought on by heart disease, is not particularly common.[7] However, vasovagal syncope or carotid sinus syndrome is found in every day practice and it challenges the osteopathic physician to trace the cause of these reflex disturbances.

Extracardiac factors, then, must be considered carefully. Physicians are consulted chiefly because of spontaneous attacks of syncope, vertigo, and at times convulsions. In these patients a careful search may be made in the region of the carotid sinus for enlarged lymph glands, neoplasms, inflammatory processes, ar-

teriosclerotic aneurysmal dilations of the sinus, as well as the consideration of the emotional status of the patient, for this latter condition alone can influence carotid sinus activity markedly in some individuals. Evaluation of the patient from the standpoint of cervical and upper thoracic vertebral osteopathic lesions is an important factor to consider. Central nervous system syphilis may be mentioned as a possible cause of altered carotid sinus activity.[1]

In persons experiencing hyperactive carotid sinus, there is noted, in addition to the aforementioned, weakness, fainting, dizziness, and tinnitis. There is usually a definite aura present; spots before the eyes are a common occurrence. Epigastric distress is a symptom frequently met. Patients may turn pale and perspire freely. Numbness in the extremities may be an accompaniment. When unconscious, a person will exhibit dilated pupils, and this state will last from 2 or 3 seconds to 20 minutes.

Sometimes breathing is slow and labored. Decreased bladder tone and increased gastric tone may occur, because of the altered level of activity of the autonomic nerve supply of these organs. Diminished epinephrine secretion also takes place. There have been some cases of exophthalmos in induced attacks, the exophthalmos quickly receding after the experiment. Acrocyanosis has been noted. In a subject having symptoms of carotid sinus hyperirritability, from mild vertigo to severe convulsions, the diagnosis can usually be established when a reproduction of the symptoms is accomplished by external sinus compression. It is interesting to note that an attack occurs when the individual is sitting or standing; rarely will it occur when in the recumbent position.

There are varying grades of heart block as well as long periods of cardiac standstill. I can recall one instance in which a malignant tumor in the region of the carotid sinus produced a prolonged complete auriculoventricular heart block. Premature ventricular contractions are seen frequently.

Attacks of unconsciousness do not come with any degree of regularity; they may vary from several seizures in one day to one attack yearly. When the patient is in a convulsive paroxysm, he rarely loses sphincter control and it is seldom that the tongue is bitten. Sometimes turning the head to one side suddenly will initiate an attack; looking sharply upward will be the exciting factor in the onset of an episode. Carrying objects against the neck, such as sacks of flour, or pressure on the neck by using tight fitting collars may precipitate an attack. Even a light stroke of the razor on the neck has been known to elicit overactivity of the carotid sinus. Many authors have reported syncope and other carotid sinus manifestations caused by barbers securing towels too tightly around the neck. There is a tendency for an attack to occur during the menstrual period in some women; the causative mechanism is not known, but in epilepsy episodes occur at the time of menstruation in some instances.

The carotid sinus plays a distinctive part in the treatment of simple paroxysmal auricular tachycardia; application of pressure over the sinus will sometimes reduce the heart rate to normal. The carotid sinus may possibly have a role in the differential diagnosis of simple auricular tachycardia, ventricular tachycardia, and auricular flutter, since the latter two are unresponsive to carotid sinus compression. However, it must be remembered that carotid sinus pressure will not always relieve paroxysmal auricular tachycardia and that at times auricular flutter may respond during the time pressure is exerted and the ventricular rate is slowed.

As mentioned previously, reproduction of episodes manifesting carotid sinus sensitivity is important from the diagnostic standpoint. In carrying out the technic of pressure exertion over the carotid sinus, the following review is presented: It is more satisfactory to have the patient in the recumbent or semirecumbent position. The head should be placed to one side a little and tipped slightly backward. The carotid artery is palpated as high up on the neck as possible. Sometimes the bulblike structure can be palpated easily, but in my personal experience this is not usual. The sinus most frequently lies at the level of the upper border of the thyroid cartilage and just below the angle of the jaw. The vessel is difficult to palpate and the position of the sinus is variable. Fatty tissue in the neck is mistaken for the sinus on occasion. When the physician is satisfied that the sinus has been located, firm pressure is made with the thumb so as to compress the vessel against the vertebral column. It is never necessary to exert pressure on both sinuses at once. It is good practice to use the stethoscope and at the instant the heart rate slows, pressure against the sinus should be discontinued. Considerable care should be taken when carotid pressure is exerted in elderly people because of the possible danger in producing a permanent or transitory hemiplegia; this is not common but such cases have been reported.

Louisa Burns[8] and her co-workers at the Sunny Slope Laboratory found that atlas lesions in rabbits produced variable periods of bradycardia. Whether or not the carotid sinus played a part in the reflex mechanism is not known. A great part of the experimental work being done by these osteopathic scientists is devoted to vascular and cardiac physiology. I have no doubt that some of the innumerable questions relating to the carotid sinus reflex will some day be answered on the basis of osteopathic research.

The treatment of hyperactive carotid sinus reflex is at best difficult. When the symptoms are mild and episodes occur infrequently, very little treatment is indicated other than instructing the patient to avoid quick movement of the head. The surgical removal of tumors or other masses in the region of the carotid sinus is necessary if manifestations of the reflex are severe. Articles of clothing which make pressure in this region should be renounced. Occupational adjustments sometimes have to be made.

Drug therapy in general is unsatisfactory. Sodium phenobarbital in 1 grain doses three times daily, for a period of a week or 2, followed by smaller doses depending upon the severity of the symptoms, has been found helpful. Ephedrine sulphate, Dilantin, atropine sulfate, and Benzedrine have been used with only slight success. Caffeine and calcium gluconate have no effect. No examination is complete without careful consideration of the cervical and upper thoracic vertebral structures and the application of appropriate osteopathic manipulative therapy when indicated.

All attempts should be made to correct psychologic misbehaviour; emotional problems arising out of anxiety and fear must be studied and treatment instituted. When medical treatment has failed to produce success in the more severe cases, such as those characterized by increasingly long periods of syncope or convulsive states, surgical management should be offered in selected cases. Destruction of the sinus by periarterial

sympathectomy of the bifurcation of the common carotid artery has given gratifying results in a few cases.[9] Intracranial section of the glossopharyngeal nerve has been performed on a few cases.

Both medical and surgical management of those individuals with a hyperactive cardioinhibitory carotid sinus reflex has been generally unsatisfactory because of the complex neurovascular physiology involved. The osteopathic research scientist, therefore, is challenged again to undertake further exploration and investigation of this syndrome.

Times Bldg.

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Pneumonia—Comparative Therapeutics

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Knowledge and experience in the treatment of pneumonia go back to antiquity. Hippocrates practiced medicine about 2400 years ago. There has been some dispute about the authenticity of some of the writings ascribed to him, but it is universally agreed that "On Regimen in Acute Diseases" is genuine. The following is abstracted from that portion of his writings:

Peripneumonia, and pleuritic affections, are to be thus observed: If the fever be acute, and if there be pains on either side, or in both, and if expiration be attended with pain, if cough be present, and the sputa expectorated be of a blond or livid color, or likewise thin, frothy, and florid, or having any other character different from the common, in such a case, the physician should proceed thus: if the pain pass upward to the clavicle, or the breast, or the arm, the inner vein in the arm should be opened on the side affected, and blood abstracted according to the habit, age, and color of the patient, and the season of the year, and that largely and boldly, if the pain be acute, so as to bring on deliquium animi, and afterwards a clyster is to be given. But if the pain be below the chest, and if very intense, purge the bowels gently in such an attack of pleurisy, and during the act of purging give nothing; but after the purging give oxymel.[1]

From an objective viewpoint, the description of pneumonia by Hippocrates is quite modern, even though the centuries have added the microscope and its intimate revelations of the structural changes in lung tissues. After the Hippocratic era therapeutic progress in the management of pneumonia was just about nil for the next twenty-three and a quarter centuries or until the advent of osteopathy in 1874. I refer with emphasis to this event as a milestone in medical progress. The years intervening between the discovery of osteopathy and the advent of the sulfonamides and the antibiotics produced little, aside from a few refinements, in the therapy of pneumonia.

Lobar pneumonia constitutes the largest proportion of the severe cases of bacterial pneumonia throughout the world. However, the 1945 *Statistical Bulletin of the Metropolitan Life Insurance Co.* reveals a striking decline in frequency and mortality of this disease in the recent years. In 1934 the mortality rate from pneumonia was 65 per 100,000 persons of all ages; by 1944 it had dropped to 33.4. It is significant that fatalities under present-day treatment are limited almost entirely to persons over 50 years of age with complicating underlying conditions or to those patients for whom the treatment has been delayed too long. Typical lobar pneumonia in the vast majority of cases is caused by the pneumococcus, that is, in about 96.1 per cent. The other 3.9 per cent are caused by the hemolytic streptococcus, Staphylococcus aureus, or Friedländer's bacillus. Therefore, only by early bacteriologic examination of the patient's sputum and blood and the determination of organism sensitivity against the bacterial agent being used can the clinician make sure of the best form of specific therapy to employ in any particular case.[2]

The pneumococcus was discovered independently by Pasteur in France in 1881 and by Sternberg in the United States in the same year. However, the organism was not known to be associated with disease in man before the extensive investigations of Weichselbaum, who demonstrated conclusively its etiological relation to pneumonia in man in 1886.

By 1913 the pneumococcus was found to fall into four distinct groups designated as Types I, II, III and Group IV, on the basis of specific agglutination and protection tests. Of these, Types I, II and III are found in the majority of cases of pneumonia, produce the most severe types of infection, and have specific immunological characteristics. Group IV is immunologically heterogenous and is made up of all pneumococci not belonging to the first three types. These main types have been further divided serologically until there are now known seventy-five subtypes.

Typing of pneumococci is usually done by the Neufeld method, which is based on the principle that swelling of the capsule substance occurs when pneumococci are placed in the rabbit antiserum of the corresponding type and not in the presence of serums of other types.

As a strict parasite, the pneumococcus is found in man rather than his environment. Healthy carriers are common and the great majority of pneumococci found in them are the relatively less virulent types of Group IV.[3]

Infections with Types I, II, and III produce a much higher mortality rate than Group IV. It is ob-

vious that the determination of pneumococcic types is a matter of great practical importance in the therapeutic use of antisera.

The results of the therapeutic use of antiserum are variable, being excellent in some types of pneumococcic infection and not successful in others. The treatment of Type I infections with specific antiserum is relatively successful, with a 50 per cent reduction in case fatality, Type II infections do not respond so well to serum therapy, and Type III infections are little benefited. Some types comprising Group IV appear to respond quite well to antiserum treatment.[3]

Today, because of the effectiveness of modern specific therapy by the use of penicillin in combating pneumococcic pneumonia, serum therapy has been abandoned almost entirely and the sulfonamides are recommended only if penicillin is unavailable or if the patient is sensitive to penicillin.

Physicians are now inclined to institute treatment by penicillin in home care on the basis of clinical symptoms and bacteriological examinations of the blood and sputum are infrequently made. However, it is generally found that Type III pneumonia produces the highest fatality rate, even with the newest therapy and, therefore, the prognostic significance of typing must be recognized. Identification by the clinician of a more formidable foe should bring alertness in management which conceivably might be reflected in better care and a lowered mortality.

Frisch[4] has developed a simple test which merits attention. It consists in counting the number of extracellular pneumococci per oil-immersion field in a stained smear of sputum. The organisms in ten widely separated fields are counted. The relation of the number of pneumococci to the prognosis is as follows: 10 or less per field, prognosis excellent; 11 to 35, good; 36 to 65, fair; more than 65, poor.

Penicillin, because of its low toxicity and the fact that it can be administered parenterally or orally, is the ideal antibacterial agent for the treatment of pneumococcal pneumonia. All of the serologic types of the pneumococcus, as well as the hemolytic streptococcus, Staphylococcus aureus, and Streptococcus viridans are sensitive to the antibacterial action of penicillin. However, the Friedländer's bacillus is almost entirely resistant to the action of penicillin.[2] This latter organism responds to sulfonamides variably, some cases responding favorably, others little or not at all. Chloromycetin seems to offer the most effective agent against the Friedländer's bacillus, for in tests it is found to inhibit these strains from many sources.

Experience has shown that there is little to be gained by combining penicillin and the sulfonamides in the treatment of pneumococcal infections. The combined action of penicillin and the sulfonamides is merely additive and no synergistic effect is realized. The recommended dose of penicillin by the intramuscular route is 40,000 to 50,000 units of the aqueous solution. In severe cases the dose is repeated every 3 hours around the clock until evidence of a crisis develops. When the pulse, temperature, and respirations are well controlled, the night doses are eliminated. Therapy should be continued for at least a week.[2]

Variables in the therapeutic schedule are the size of the individual doses, the interval between injections, and the total duration of treatment. Most of the well-established schedules have been devised in an effort to maintain a constant blood level. Schedules are being developed which involve less frequent administration of larger initial doses of penicillin. It is found that pneumococcal pneumonia can be treated satisfactorily with 300,000 units of crystalline procaine penicillin G dispersed in water or saline every 12 to 24 hours, depending upon the severity of the infection. Neither oral penicillin nor penicillin aerosol is as effective as the intramuscular method of administration, in the treatment of pneumococcal pneumonia.[5]

An additional modality is offered by the use of x-ray irradiation as an adjunctive in the treatment of pneumonia. This is used by some clinicians in combination with osteopathic manipulative treatment, in either bacterial or viral pneumonia, and gives better results than when either is used alone.[6]

Probably the best results are obtained in x-ray irradiation where there is considerable hypertrophy in the parabronchial and mediastinal lymph nodes.[7]

The widespread epidemics of viral pneumonia within the last decade have generally increased knowledge of this disease entity from several viewpoints. The term "primary atypical pneumonia" serves to distinguish it from the better understood bacterial pneumonias. It is caused by a filtrable virus and is transmitted from human to human by the respiratory route. The clinical course ranges from very mild to moderately severe to fatal. Approximately one fifth of the patients become seriously ill.

The white blood cell count stays within a normal range in the early stages and rises as the disease progresses, becoming very high in the seriously ill patients. The x-ray findings show areas of increased density in the lung fields and are considered essential for the diagnosis of primary atypical pneumonia. The sedimentation rate becomes elevated early and returns gradually to normal during the period of recovery. It has been used as a guide to regulate the convalescence, which may be protracted.[8]

Therapy, at present, is symptomatic. The sulfonamides, penicillin, and streptomycin have been used, but not with the success as observed in the bacterial pneumonias. The only apparent excuse for their use in viral pneumonia is to combat secondary invasion by organisms sensitive to them. Their use is now recommended only after the secondary invader has been identified in the sputum or in the blood.[6]

Dihydrostreptomycin, a new modification of streptomycin, is less toxic than streptomycin and is less likely to cause neural damage. Repeated intramuscular injections of 1 to 2 grams daily in divided doses given every 12 hours are generally used in viral pneumonia. Because dihydrostreptomycin is eliminated in the urine, smaller doses than usual are recommended for patients with renal damage. Occurrence of eighth nerve damage is dependent on dose and duration of treatment and patients should be advised of the possibility of auditory impairment. When it has been observed incident to the therapeutic use of dihydrostreptomycin, it has appeared more slowly than anticipated from previous experience with streptomycin. Apparently, a daily dosage of 1 to 2 grams of dihydrostreptomycin will seldom produce this undesirable effect.[9]

Aureomycin appears to be quite effective orally, 1 gram every 6 hours, a total of 4 grams a day. Treatment should be continued in viral pneumonia until the patient has been afebrile several days.

The successful use of chloromycetin in a fairly large series of primary atypical pneumonia indicates that it has a rapid and effective action in this condition. Doses of 0.5 gram are given every 2 to 3 hours

until 3 grams have been given; then 0.5 gram four times daily is the recommended dosage. The temperature may become normal in 36 to 48 hours. Treatment should be continued for 3 to 5 days after the afebrile period in order to prevent relapse.

Chloromycetin was originally obtained from a soil organism isolated in Venezuela. It has been identified chemically and is the first antibiotic to be produced synthetically on a practical basis. It is orally effective and in infants and children appears to be effective when given rectally. It is compatible with other antibiotics and sulfa drugs.

During the influenza epidemic of 1918, osteopathic manipulative therapy proved to be a more effective method for control of pneumonia than any used by competitive schools of medicine. We can make that deduction now as it was then by statistical study. We might well use that period for an evaluation of comparative therapeutics and accept statistics compiled then, because the osteopathic profession in that day placed more reliance on specific manipulative procedures than it does today on specific chemotherapy in the treatment of pneumonia. This is in no way an indictment of our present more liberal approach to treatment of disease generally. Rather, it spotlights a highly developed scientific attitude of selectivity of method in the osteopathic profession in 1918, for the chemotherapy used in pneumonia then has subsequently been almost universally condemned not only for being useless but for probably contributing to the high mortality figures.

The statistics tabulated then were from a questionnaire returned by 1,370 osteopathic physicians who presented a total of 49,611 cases of influenza treated. The *Chicago Evening Post* commenting on the report had this to say: "Figures compiled by the osteopaths thruout the country show that out of 49,000 cases of flu treated, of which between three and four thousand developed pneumonia, only 472 died—a mortality of less than 1 per cent. As nearly as can be estimated, the total mortality from flu thruout the country has ranged from 5 to 15 per cent."

We have the osteopathic literature of that day to help us determine the procedure followed. For example this description of the management of pneumonia appeared in a popular textbook:[11]

> The disordered tissues that should be corrected . . . are: contraction of the thoracic and dorsal muscles, subluxations of the ribs and dorsal vertebrae from the second to the seventh, inclusive, and the upper cervical vertebrae . . . . However, owing to the fact that the vasomotors are not especially abundant here, all increased chest mobility and deep breathing and abdominal aid will materially assist the circulation. Also, carefully treat the middle and inferior cervical regions for the lymphatics of the lungs. . . . The specific micro-organisms that influence the course of pneumonia are naturally very important factors; but observing and improving the general health, and establishing an unobstructed circulation through the diseased lung tissues will hasten the crisis by favoring a rapid formation of antidotal substances to neutralize the poisonous substances produced by the micrococcus lanceolatus.

In the intervening years a great many refinements have appeared in osteopathic manipulative therapy, but basically we adhere rather closely to those proved principles that were followed in 1918.

In 1939[12] the following osteopathic procedures were used by the Staff at the Osteopathic Unit in the Los Angeles County General Hospital in the treatment of pneumonia in children.

1. Relaxation and gentle traction of cervical area.
2. Gentle steady pressure to contracted muscles of thoracic area of spine.
3. Light stroking of lower intercostal spinal spaces of both sides.
4. Gentle attempts to raise ribs.
5. Steady pressure to upper thoracic area for one minute.
6. Intermittent pressure to suboccipital area for 30 seconds.

Sig: When temperature is above 103 F., treat patient every two hours.

When temperature is below 103 F., treat patient every three or four hours.

In 1947 the following summary was given for the osteopathic management of lobar pneumonia. "The actual treatment consists of vertebral and rib lesion correction, deep manipulation along the spine around the shoulders, the use of the lymphatic pump, bimanual manipulation of the liver and spleen, and the treatment of the thyroid and adrenal glands."[13]

Changes do not occur easily in a therapy that depends upon anatomical detail to promote clinical and physical responses. It is a common error to permit paraphernalia to become an impediment in administering osteopathic manipulative treatment. Often the physician may, with reluctance, interrupt the administration of oxygen in order to apply manipulative therapy. This is especially true when tent equipment is used. Ordinarily, manipulative treatments are of short duration and should be given as indicated and usually can be without disturbing the administration of oxygen to any appreciable extent.

In evaluating osteopathic manipulative therapy and drug therapy in the management of pneumonia, it may be illuminating to scan the literature concerning both methods. Recent drug therapy will be found to be in violent disagreement with the methods of yesterday. No such change will be found in osteopathic procedure.

Sometimes we may momentarily forget that the osteopathic profession represents the second largest school of medicine. To preserve the contributions to medical culture made by this school is our great and serious responsibility. Nevertheless, we shall consistently applaud, support, and utilize new methods in combating disease, whether they are developed in our own institutions, in those of other schools of medicine, or in those great and friendly research centers which are ethically promoting the progress of medicine.

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Medical Treatment of the Complications of Peptic Ulcer

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In any 10 year period in America one and one-half million people will develop peptic ulcer. The magnitude of the subject may further be appreciated if we look back over the last 50 years and recapitulate concerning peptic ulcer. In that period, there have been recommended at least forty-six different therapeutic regimens together and no less than eighty-nine pharmaceutical preparations. Certainly, there has existed a perplexity of confusion, making the hapless ulcer sufferer a clearing house to determine the efficacy of the drugs and the regimens.

Let us digress further and list some of the theories as to etiology of which there were, at the last count, fourteen according to Cunha.[1] Included are the focal infection theory as brought out by Rosenow, Cohnheim's mechanical factor, constitutional predisposition with its many angles, and the endocrine, allergic, and neurogenic theories. Feldman[2] names intracranial disease, trauma, and burns as etiological factors in acute ulcer. Harvey Cushing[3] thought the hypothalamus might be incriminated. And so the theories as to the cause go on *ad infinitum*.

These introductory remarks are not made in criticism but rather to explain in a brief manner why a disease entity such as ulcer is fraught with complications. The most common ones and the ones we are called upon to treat most frequently are:

1. Hemorrhage
2. Malignant degeneration
3. Stenosis or obstruction
4. Perforation

Hemorrhage from a peptic ulcer immediately poses the following questions:[4]

1. Will the bleeding cease?
2. How is the case to be treated?
3. Is surgical intervention necessary?

To the first no answer can be made dogmatically at the bedside. In the patient under 40 years of age, bleeding will generally cease under medical management.

As to how to treat the case Miller[5] says that, in his opinion, hemorrhage is as strictly a medical problem as perforation is a surgical one. I think that is the consensus of most men today. But in addition I would like to add that much depends upon the rate of hemorrhage. The rate is far more important than either the amount or duration.

Fully cognizant that some of my surgical confreres may not agree with Miller's statement, I hasten to say, I am endeavoring to handle this most difficult problem from the clinician's angle as he views the hemorrhaging case at the bedside. It is not, primarily, a discussion of a duodenal or gastric hemorrhage, for at this point the origin may not be known, nor is it mandatory that it should be.

The surgeon may turn out to be our sheet-anchor, if the case is bleeding from an eroded large sclerotic vessel buried in the base of a gastric ulcer. All the controversy as to the immediate treatment program can be solved much more easily if we think always in terms of rate of hemorrhage rather than amount or duration. Hoerr, Dunphy, and Gray,[6] in a study of 191 cases of upper gastrointestinal hemorrhage, set up the following groups as to rate and this grouping dictated the treatment. Their cases were classified arbitrarily as:

1. Moderate
2. Severe compensated
3. Severe uncompensated
4. Exsanguinating

The criteria used to determine the different classifications are:

1. The presence of syncope or shock as manifested by fainting, sweating, cold clammy extremities, hypotension, and tachycardia
2. The hematocrit reading, and
3. The number of transfusions required to stabilize the circulation.

A moderate hemorrhage is one in which between 500 and 1000 cc. of blood are lost. Patients with such a hemorrhage develop melena, and hematemesis and occasionally faint at the beginning. They do not show evidence of syncope or hypotension upon reaching the hospital. The hematocrit is above 30. Transfusions are rarely needed. Surgery of an emergency nature is never indicated.

In severe compensated hemorrhage, serious blood loss has occurred, as much as a liter in 24 hours. The hematocrit is 30 or less. The rate of hemorrhage, however, is sufficiently slow so that patients do not again develop syncope once circulatory stability has been brought about by an occasional transfusion of 500 cc. of blood. They are not cases for emergency operation; they should be treated medically.

In the severe uncompensated hemorrhage, not only is syncope evident at the onset, but also the patients are in shock when admitted to the hospital. They will require from a liter to 1500 cc. of blood. The response to transfusion is good, however, and they do not again develop syncope or hypotension. Bleeding may continue as shown by a falling hematocrit, hematemesis, and tarry stools. More will be said concerning this group under treatment.

In the exsanguinating hemorrhage syncope and shock are profound. A transfusion of from 1 to 2 liters may stabilize them, but they do not remain so. They fail to maintain a stable circulation even when transfusions are given at the rate of 500 cc. every 8 hours.

TREATMENT

In patients with moderate hemorrhage, as in all bleeding cases, fear and apprehension are major factors and it becomes necessary to combat them with sedation. Because of the possible adverse effects of morphine, barbiturates or some other alkaloid than morphine should be used.[7] The physician's own attitude and behavior is an important factor in allaying the patient's fear.

It is now generally agreed that a prompt feeding program should be instituted using such formulas as

the Lenhartz egg milk mixture; Andresen's gelatin, lactase milk or the Sippy diet. However, soft bland diet given six times daily, including toast, gelatin, custard, cottage cheese, rice, potatoes, and even finely chopped meat, seems to suffice just as well and it has the advantage of variety.

The routine laboratory work should include, in addition to the blood count, blood typing, hematocrit reading, and determination of blood urea nitrogen and serum proteins and chlorides.

Further treatment in this group would depend upon the individual case. Dehydration with hypoproteinemia should be treated if it exists. This will be discussed later.

In treating patients with severe uncompensated hemorrhage close cooperation is required between internist and surgeon, as bleeding may develop at so rapid a rate that exsanguination results in a short time. As previously mentioned, shock is evident upon admission. One to two liters of blood will be required to stabilize the circulation. Continued bleeding will have to be treated with 500 cc. of blood every 8 hours. That program generally keeps them compensated. Although the hematocrit may rise and fall, there is no marked hypotension, syncope, or collapse. The previously mentioned dietary regimen may be used in the midst of the hemorrhage.[5] Treatment of this type can continue for some days and in the majority of cases the bleeding will eventually cease.

In the event that 500 cc. of blood every 8 hours is not adequate, hypotension, and even more important, recurrent syncope develop, in which case the patient should be classified as exsanguinating.[6] The rate of transfusions should be increased until the circulation is stabilized and surgical intervention is indicated.

In conclusion let me say that while treating bleeding cases, the physician is under no obligation at this time to cure the ulcer. To advocate surgery with the idea that while getting rid of the ulcer the bleeding can be controlled is not good judgment. On the other hand, those patients who have had repeated episodes of bleeding may well be sent to the surgeon as an interval procedure.

MALIGNANT DEGENERATION

Whether or not a benign peptic ulcer actually undergoes degenerative malignant changes is a controversial question. There are many[8,9] who feel that it does not, but instead the original lesion was cancerous from the onset. The incidence of malignancy at the location of a duodenal ulcer is so small that it may practically be ignored. On the other hand, gastric ulcer when first seen immediately brings up the question as to malignancy. In fact we are so impressed with this complication that it becomes a perplexing diagnostic rather than a treatment problem.

Allen and Welsh[10] in a study of 512 cases originally diagnosed as gastric ulcer found 34 to be cancerous, a diagnostic error of 6.6 per cent. Two hundred and ninety-five of the 512 later had resections and tissue studies showed 32, or almost 11 per cent, had carcinoma. It is safe to say that 1 out of 10 cases diagnosed as gastric ulcer has cancer.

Of course we all know that the only treatment for gastric malignancy is early diagnosis and surgery. With that in mind, what can be done to improve upon this diagnostic error of 10 per cent? The following statements are offered to aid in the diagnosis of cancer:

1. If the ulcer is of short duration and the patient is over 50, it most likely is malignant.

2. Prepyloric and greater curvature ulcers are almost always malignant.

3. Chronic recurrent ulcers on the lesser curvature should be regarded with suspicion.

4. Achlorhydria with histamine stimulation is noted in about 40 per cent of gastric carcinoma.

5. A positive Papanicolaou test on gastric sediment, provided the test is made by one well versed in the interpretation of the smear, is highly suggestive of cancer. However, it should be remembered that a negative Papanicolaou test does not preclude the presence of cancer.

6. According to Allen and Welsh[10] the rate of healing of gastric ulcer is very important and should be closely observed. All patients with gastric ulcer should have x-ray studies before beginning treatment and again 3 weeks after treatment has been instituted. If significant improvement is not noted an additional 2 weeks under strict hospital routine is indicated. After that period marked healing should have occurred. If it has not, medical therapy should be abandoned.

TREATMENT OF OBSTRUCTION

Allen and Welsh[10] state that any case diagnosed as gastric ulcer and presenting symptoms of pyloric obstruction without any demonstrable duodenal ulcer should be operated upon. The gastric lesion in this instance is most always cancer.

Most patients having a duodenal ulcer will at some time have signs of obstruction. This complication quite obviously in many cases can be functional, associated with the hyperspasticity existing in and around the pyloric area. Organic retention occurs either because of inflammatory reaction in acute duodenal ulcer or cicatrical fibrosis associated with the chronic recurrent type. With those two origins in mind, namely the functional and the organic, it becomes apparent that response to medical management will range all the way from complete success to absolute failure. Many of the functional cases will respond to any one of the antispasmodics such as, belladonna, Syntropan, Trasentine, or Donnatal. These drugs are usually a part of the routine treatment of any ulcer located in this area. The occasional case of retention due to inflammation associated with an acute ulcer may at first defy these drugs. The stomach in these cases will often be found to be markedly overdistended. Complete emptying via gastric lavage with bed rest, mild sedation, small frequent liquid feedings for a few days, plus the use of one of the many available antispasmodics will solve this problem in the majority of instances.

Obstruction due to cicatrical fibrosis associated with longstanding recurrent ulceration poses a problem of no mean proportions. The physician usually does not see these cases until quite late. The onset has been insidious with occasional and recurrent vomiting. Many of these patients will need surgery to effect a cure. Their nutritional status is poor, because of self-imposed dietary restrictions over a long period. These patients have serious disturbances in body chemistry. Low blood proteins may be making the obstruction even more complete, by producing tissue edema in the pyloric area. The chlorides are low due to frequent vomiting. Dehydration, hypochloremia, alkalosis, and azotemia are prominent features.

Naturally, these individuals are poor candidates for any type of curative procedure. Gastric lavage and small frequent feedings, preferably the Sippy regime, may have to be used. One of the atropine-like drugs is indicated but generally surgery will be required and the internist's problem is one of correction of the disturbance in blood proteins and electrolytes. This same change in body chemistry occurs in the previously mentioned complications of hemorrhage, et cetera, and often its correction is part of their treatment.

Since chloride loss is primarily to blame, the condition is treated by intravenous sodium chloride. Some idea of the necessary amount of chloride needed may be computed by resorting to the following formula: 0.5 gram per kilogram of body weight for every 100 mg. the chlorides are below normal. This amount is given for several days. If alkalosis exists, too much sodium chloride will exaggerate the condition because of the sodium ion. Repeated carbon dioxide combining power tests will reveal this complication.

Three laboratory procedures should be carried out at frequent intervals, namely, the determination of blood proteins and chlorides, carbon dioxide combining power, and blood urea.

Hypoproteinemia is often a prominent feature and is treated by supplying the minimum protein requirement of 1 gram per kilogram of weight plus an additional amount to make up the deficit. Usually, about 100 grams of protein will be needed daily. This can be given in the form of plasma, whole blood, amino acids, or one of the casein hydrolysates, such as 6 per cent Parenamine. In addition, 100 to 150 grams of carbohydrate are required, which can usually be given along with the chlorides in the form of 5 or 10 per cent dextrose in normal saline solution. Water-soluble vitamins should be added to one of the infusions. Five cubic centimeters of Solu B together with 300 mg. of ascorbic acid are recommended.

The daily protein and chloride requirement will vary in each individual depending upon the degree of dehydration and hypoproteinemia. By daily protein and chloride determinations, the amount needed can be calculated accurately enough to get patients ready for surgery.

PERFORATION

Perforation is the most sudden, most severe, and most immediately disabling complication of peptic ulcer. Until recently less controversy existed as to the treatment of this complication, than to any of the others. Most men today feel that the presence of or suspicion of a perforation is an indication for surgical intervention. Hyman[11] says that the occurrence of a perforation is an absolute surgical indication. Thompson[7] notes that Wangensteen emphasized the fact that there should be no debate about the advisability of surgical closure in the early case but that he did go on to say that in certain cases where there was but little evidence of peritoneal soiling it might be treated by continuous suction using an inlying duodenal tube.

McClintock[12] recently reported it was the practice to treat all cases of perforation by conservative measures at the Baltimore Marine Hospital.

Taylor,[13] while agreeing with Wangensteen on the treatment of late cases, does not feel that the majority of early ones should be subjected to surgery. He arrived at this conclusion because when operating upon early cases he repeatedly found the peritoneal fluid sterile and the perforation sealed over either by the omentum or by firm adhesion to a neighboring viscus. Later upon finding this condition he left it undisturbed and closed the abdomen without drainage. No sequelae developed. Upon investigation of these cases, Taylor found that one factor was common to all, namely, that the last meal eaten had been consumed some time prior to perforation and therefore the stomach was relatively empty at perforation. He then produced an empty stomach by continuous suction in 28 cases, depending upon the peritoneum to take care of the fluid already spilled and on local adhesions to wall off the perforation. Twenty-four out of the 28 got well. Of the four deaths, 3 were unrelated to the perforation. McClintock[14] treated 35 patients with this method and 34 got better.

The basis of the conservative treatment is relatively simple. The patient when first seen is given ¼ gr. of morphine intravenously. A Levine tube is passed through the nose into the stomach and the gastric contents are aspirated. The tube is then attached to the Wangensteen apparatus and continuous suction employed. The Levine tube is irrigated often to prevent any clogging. Crystalline procaine penicillin G, 300,000 units daily, is given. Two to 3 liters of fluids are given daily either by intravenous or subfascial injections using normal saline solution and 5 per cent dextrose in saline. Water, 1 ounce at a time, is allowed on the second day and milk on the third day.

Taylor[13] admits of two contraindications to this treatment:

1. Inability of the patient to accept the treatment
2. The presumptive evidence of large amounts of spill in patients who have eaten or taken large amounts of fluids immediately prior to the perforation.

Experience with this method of treatment by members of the Department of Surgery of the Bangor Osteopathic Hospital in two cases has been gratifying, although I must admit it was instituted with some fear and trepidation on my part. Convalescence was not stormy. The abdomen became soft and there was no distention. However, I feel that this conservative medical management should not be used in those cases having extensive percussion dullness down the right abdominal gutter, as that indicates extensive spill with much peritoneal soiling.

Time and trial will evaluate this procedure and while it may not replace surgery entirely, it will find its proper place in treatment. The internists should try to keep an open mind not only on the treatment for perforation but also on the treatment of all the complications of peptic ulcer.

CONCLUSIONS

1. Rate is the most important aspect of hemorrhage in peptic ulcer. Observation of the patient as to hypotension and syncope will enable the physician to ascertain to some degree what the rate may be. By this method cases with a rapid rate can be discovered early and appropriate medical or surgical treatment instituted.

2. Gastric ulcer always presents the diagnostic problem as to whether or not a malignancy exists. Too much emphasis cannot be placed on this point. Healing should occur promptly. Surgery should be resorted to in all cases that do not heal rapidly. Surgery should be performed immediately on all gastric ulcers showing obstruction in the absence of duodenal ulcer.

3. Long standing chronic duodenal ulcers with the obstructive syndrome should not be allowed to go on indefinitely as they become difficult to treat because of disturbed body chemistry.

4. Certain selected cases of perforated ulcer may do as well or better under conservative treatment using constant suction, chemotherapy, and parenteral fluids in sufficient amounts to maintain normal proteins and blood chlorides as under surgical therapy.

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Gerontology of the Cardiac Patient

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Differentiation between the physiological changes of advancing years and pathological changes that may occur in the aged is a matter of extreme importance, lest the physician find himself treating physiological senescence and senility under the mistaken identity of supposedly pathological or disease processes. An aged person who is ill cannot, through any form of therapy, be brought back to the physiological normal of a person in adult maturity, which is not the physiological normal of senescent or senile maturity. Unless the physiological normal of the geriatric patient is carefully estimated, and therapy applied to attain that normal, overzealous treatment in an effort to effect the impossible in renewing the youth of the patient may result not only in failure of benefit but in actual harm to the aging organs and systems. Restoration of physiologically degenerating tissues to the state typical in earlier years is impossible.

Until recently, too little information has been available regarding the physiological normals for patients of advancing years. It is available now, however, and a knowledge of these body changes is essential for proper treatment of the geriatric patient.

The question, "Just what is a geriatric patient or when does old age begin?" is often asked. Definite ages or age limits for body changes in aging can hardly be set. Some comparatively young people undergo degenerative aging processes, while other individuals remain physically and mentally young into the later decades of life. Generally speaking, however, it is possible to anticipate age changes with fair accuracy in the large majority of people.

Since the beginning of the present century life expectancy in the United States has increased nearly 20 years. Present life expectancy is about 64 years from birth, with females a little more favored than males, and it is predicted that in another generation, life expectancy will increase to 68, or 70, or more years. This has come about as the result of modern hygiene and sanitation, prophylactic and curative treatment, and health education. Along with increasing life expectancy, age changes also average little later in life.

Age groups can be classified as follows:

Infancy—from birth to about the age of 3 years

Childhood—from about 3 years to the age of puberty, or about 13 years

Youth or adolescence—from about 13 to about 21 years of age

Maturity or adulthood—from about 21 to about 45 years of age.

At approximately the age of 45, the first real changes indicating the beginning of the aging process begin to be noted. Usually the first notable change is in the vision. Presbyopia gradually develops, and lenses become necessary for near vision. This is the period of change defined as senescence, not to be confused with senility. Changes in visual acuity are a fair index of the changing degree of senescence.

The period of senescence is very variable in duration but on the average may be considered to extend into the early seventies. During this period, there is the gradual process of normal physiological aging, and the term *senility* has no place in reference to the aging patient until, or unless, abnormal old age changes occur, meaning the development of marked infirmities of the aged, and more especially with reference to the mental as well as the physical infirmities.

It is these physiological aging processes with which this paper is concerned.

The principal physiological changes in the entire body are dehydration and wasting of tissues. It is outside the scope of this paper to mention but a few of the changes related to the cardiovascular system and blood stream.

The aging heart is inclined to hypertrophic changes and is practically the only organ in the body that does not atrophy. Changes in the blood vessels are responsible for most of the aging alterations of the heart. Arteriosclerotic alterations, although not present in all old people, are so commonly found that in consideration of therapeutic processes, they may be classed almost as physiological geriatric changes. In by far the larger percentage of people over the age of 65, regardless of Nylic habitus, some degree of atherom-

atous deposit and increase in cholesterol esters cause thickening of the inner coat and diminished caliber of the arteries, especially the coronaries. Elastic muscle fibers become dehydrated and waste, as they do in all parts of the body; atheromatous plaques may take on calcareous deposits which cause hardening of the inner coats of the arteries and eventually extend to the middle coats as well; the aorta becomes elongated, dilated, thin-walled, and tortuous to a greater or less degree, and aneurysms may develop in the abdominal aorta but seldom in the thoracic aorta on the basis of arteriosclerosis.

Similar changes may affect the heart itself but usually to a less extent. Calcium deposits may be found in some of the valve leaflets, resulting in murmurs because of improper closure of otherwise normal valves. Heart weight diminishes in spite of moderate hypertrophy and fatty deposits and calcareous plaques may occur in the endocardium. Myocardial fibrosis and dehydration occur and the cavities of the heart are increased without change in their ability insofar as the minute output of blood is concerned. Bradycardia is frequently a development of the aging process.

Changes in the veins are loss of elasticity of the inner coat and wasting and dehydration of the elastic fibers, resulting in dilatation, tortuosity, and inadequate return of blood from the extremities.

Blood pressure commonly increases somewhat during senescence, but in senility it may return to and remain at normal levels.

Changes which occur in the blood are almost entirely in the red blood elements, and then only in a moderate reduction in hemoglobin content, and a slight reduction in the red cell count to about four million in the female and four and a half million in the male. There are no special changes in the white cell count, acid base balance, or electrolytic changes, unless there are pathological rather than physiological changes in the body.

As a result of these changes in the cardiovascular system and the blood, the amount of blood and hemoglobin carried to the various organs of the body is decreased, especially where the blood supply is through terminal vessels, and proper circulation is maintained with difficulty. The larger central vessels expand and dilate at the expense of the peripheral circulation. Dilatation and loss of tonus in the veins also interferes with the return circulation, and the entire organism suffers.

Pulse changes are not too helpful in studying the aged, except in arrhythmias. Frequently the pulse becomes slower in aging hearts, but a rapid pulse may be a normal finding.

Metabolism slows in the aging body. Less food is required to maintain body needs and body temperature, and because the aging body uses less food, it is more than ever important that it be supplied with the proper type of food. Older people take less fluids than formerly, and salt and water balance is a most important consideration. Ample amounts of vitamins and minerals are necessary to prevent deficiencies and resulting disease conditions. The digestive apparatus, partly because of diminished circulatory function, is subject to pathological changes such as hypochlorhydria with sclerotic arteries, forming a basis for more serious gastrointestinal pathological processes.

In the process of aging, through changes in the nervous system, people lose much of their sensitivity to pain. Heat or ice applied to the extremities for any reason, or in fact to any part of the body, may result in damage to tissues through burns or freezing, as a result of loss of sensory function.

Congestive heart failure due to old rheumatic valvular heart disease is commonly seen in adult patients and in early senescence, but probably because rheumatic fever and rheumatic heart disease are more prevalent in children and young adults than in older people and because most of those patients do not survive to old age, not so much of it is seen in really aged patients. When it is found, the prognosis is usually not so guarded as in the younger patient because of decreased activity with advancing years.

Coronary heart disease is frequent. Angina pectoris and coronary occlusion along with sclerotic arteries and hypertension, as well as cerebral pathological conditions from the same causes, are probably the most frequent and perhaps the worst killers among aged cardiacs today. Much care must be exercised in diagnosis of symptoms such as pain or aching in the stomach or in the face or neck or pain that appears to originate in the gallbladder or other upper abdominal organs that coronary occlusion is not overlooked and the patient improperly treated.

Changes in the eye grounds are helpful diagnostic criteria, namely, narrowing and tortuosity of the retinal vessels in arteriosclerosis and in advanced hypertension. There may be retinal hemorrhages, disk elevation and edema, and disappearance of the peripheral retinal vessels in the swollen retina. Contracted pupils and cataracts may prevent easy examination of the retina, and great care should be taken in using a mydriatic, lest damage be done in the presence of a glaucoma.

Glycosuria is a common finding in aged patients, and it frequently is due to a low renal threshold rather than to a high blood sugar content. However, diabetes is a frequent complication of coronary artery disease, and blood-sugar estimations should always be made.

Hypoglycemia is frequently the cause of the complaints of weakness, dizziness, sweating, and nervousness in patients who do not use much sugar.

Secondary anemia is frequently seen as a result of dietary deficiency, as well as of various pathological conditions. Blood counts and hemoglobin estimations are important. It should be remembered that normals decrease slightly as age increases.

Chronic pulmonary conditions, bronchiectasis, emphysema, chronic bronchitis, et cetera, with cardiac changes are common findings in the aged, and usually the heart condition requires no treatment, unless actual congestive failure ensues.

Problems of treatment of the geriatric patient resolve themselves then into a recognition of the normals for the age of the patient, which is necessary knowledge on the part of the physician. The problems are numerous and important. What of activity? Elderly patients should be kept as active as possible. Protracted bed rest must be avoided when possible to prevent having a completely bedridden patient and to prevent the development of peripheral circulatory stasis, thrombophlebitis and resulting thrombotic emboli. Among many other benefits exercises prevent these occurrences, limit to some extent joint and muscle stiffening, and aid greatly the general maintenance of organic body functions, as digestion, circulation, and bowel activity. Per-

haps most especially exercise benefits the mental outlook of the patient.

Good general nursing care is of the greatest importance where nursing care is necessary. Radical changes in the living habits of the patient must be avoided. Food should be plain, somewhat the diet to which the patient has been accustomed, and it should be appetizing, nourishing, well varied, and well balanced for the patient's needs. It should be taken in small amounts, frequently in more than three meals daily. Elimination must be regulated, oral hygiene attended to, and special care taken of the skin, especially of bed patients. The extremities in all aged patients need care and attention. Proper room temperature and ventilation should be maintained. In this regard, most aged patients are more comfortable if the room temperature is kept a little higher than is generally considered comfortable.

The habitual use of tobacco, alcohol, tea, or coffee by an aged patient should seldom be tampered with. The amount of benefit that may be derived in, say, a case of chronic bronchitis by quitting the use of tobacco is frequently more than offset by the hardship and nerve strain resulting from such a measure. Radical changes in any habit may have a worse effect than continuation.

Diagnostic criteria which apply in the normal young adult are subject to much variation in interpretation in the geriatric patient. Abnormal alterations in electrocardiographic tracings which in youth might be considered of serious import may frequently be considerably discounted when discovered in older patients. Left axis deviation, notching and slurring of QRS complexes, even moderate conduction defects, such as auriculoventricular or intraventricular block, flattening of T waves, and inversion of T-4, may occur as the result of various physiological senile alterations and frequently may be seen in tracings taken on patients who are either dehydrated or who have slight edema or other skin changes. Increasing insensitivity to pain may mask a great many conditions that cannot be discovered objectively.

Potent drug medication must be used with great care, the end result being to obtain a normal for an aged, rather than a younger, patient. A prominent medical authority[1] has said in this respect, "The less said about medicines the better." And again, "Overenthusiastic treatment, whether with drugs, diet or exercise, will supply autopsy material."

There are very few drugs that are of specific use in care of the geriatric cardiac patient. Support of the failing heart with digitalis, usually in dosage less than that for a rugged adult, and use of diuretics for intractible edema, also in diminished dosage, are sometimes necessary, as are some other medications in specific cases. Ample thiamine therapy will frequently aid in reducing edema in myocardial failure and ascorbic acid is without doubt a necessary aid in various of the peripheral circulatory conditions. After all, the vitamins are not drugs but foods, though they have been made more or less of a racket by some commercial enterprises.

Sedatives have the effect of stimulation in many elderly people. When they are effective as sedatives, they should be used in materially smaller doses than in younger patients. Sulfonamide drugs are dangerous in the aged. The more recently discovered antibiotics are probably safe in controlled dosage.

Physical therapy in its various forms, careful application of heat and cold, short-wave diathermy, infra-red light, hydrotherapy, and massage, all of which may be included as a part of good nursing care, are frequently helpful measures.

Medicines given for hypertension are valueless, with the possible exception of amyl nitrite or nitroglycerin as emergency treatment in attacks of coronary insufficiency. Treatment of luetic heart disease with the arsenicals frequently does more harm than good in the aged.

Treatment of arteriosclerotic renal involvement by the maintenance of proper salt and water balance is usually more effective than with any form of drug medication. Rest is also a valuable treatment in improving both cardiac and renal function.

To quote Thewlis[1] again, "The treatment of old age might be summed up as follows: treat obesity, correct constipation, and instruct the patient to avoid all strains, take frequent rest periods, use only reasonable amounts of alcohol and tobacco. Tea and coffee may be taken in moderation." Thewlis is, of course, recognized as one of the foremost medical geriatric specialists. At this point the question may be asked, "Where does the physician fit, and of what use is he in the treatment of aged patients?"

Much has been done in the past in careful grading of medical dosages through infancy, childhood, adolescence, and maturity, but there the matter has been dropped. The senescent patient has been supposed to thrive on medical dosages designed for a robust young adult. As a result, geriatric patients have been subjected to the abuse of severe overmedication. Perhaps as frequently they have been neglected with the statement that there is not much to be done for an aged patient.

The aged want more to live than do young people and they want to be comfortable and well. Young people seem to put little value on the years of life ahead of them, taking life or death as a matter of course. To the aged patient who has come to a realization of the value of time, the one or 2 or more years of life that may be left to him are precious years. Is it right to neglect that patient in any way?

Physicians who use osteopathic manipulative therapy have much to offer the aged. Old people, like children, show wonderful response to osteopathic manipulative treatments, perhaps more than the average patient in middle life. Improvement in circulation and muscle tone, normalization of the entire body as a result of soft-tissue manipulation, carefully applied mobilization of articulations where indicated, and application of special technics of manipulation according to the particular needs of the patient all help to maintain good health and a feeling of well-being in the patient. Aged patients like manipulative treatments. As a result of them they feel better, rest and sleep better. They *are* better and they know it and appreciate it.

The osteopathic physician, by intelligent treatment intended to normalize the patient according to the physiology of his age, can accomplish much for the geriatric cardiac.

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Demineralization of Bone—Medical Phase

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INTRODUCTION

In most instances, a case of bone disease with demineralization becomes the common and complicated problem of the radiologist, the surgeon, and the internist. Laboratory studies are important in the objective evaluation but only to the degree that they illuminate and supplement the diagnostic x-ray studies. It is the roentgenologist who provides the presumptive evidence which becomes differential in the light of the laboratory investigation of bone decalcification. The internist and the surgeon help to evaluate the etiology, to coordinate the confirmatory data with the clinical picture, and to supervise the management of the patient. Each in his own way carries out the treatment.

The multiplicity of causative factors of osseous demineralization varies from the rickets of childhood to the osteoporosis of old age, and from the osteitis fibrosa cystica of hyperparathyroidism to the osteolysis that characterizes metastatic bone cancer. The etiology though greatly diversified can be divided conveniently into three categories. The first comprises neoplasms of the bone and the second, osteodystrophies resulting from endocrine and metabolic dysfunctions. The third, comprising inflammatory lesions, is seldom treated by the internist. My experience with them is too limited to justify their inclusion in this paper.

Although the treatment of many cases of bone demineralization is symptomatic, there are some patients whose care can be outlined completely only after a thorough classification of the disease has been made. Much of the therapy described in the literature is very logical from the theoretical point of view, but it is often ineffective and useless when tried clinically. This paper will take up the medical treatment as it has impressed this writer in cases of bone demineralization. For purposes of discussion, the subject will be divided into two parts, bone tumors, and osteodystrophies, with reference to some endocrine and metabolic considerations. Emphasis will be placed upon the diseases in each group which have been most often encountered. Some of the others will be referred to briefly and some will be omitted.

Absorption of bone may be due to local or general causes; it may result from constitutional functional disorders such as senescence and disuse, or from local pathologies such as tumors, aneurysms, and infections. In either event, there are two factors of importance in this absorption: first, the vascular factor which comprises the invasion of the haversian canals with granulations to produce osteoporosis, and second, the action of the osteoclasts. In some conditions, such as osteitis fibrosa, a combination of vascular absorption and osteoclastic derangement brings about demineralization.

BONE TUMORS

The primary removal of calcium from bone, or decalcification as it occurs in hyperparathyroidism and in metastatic tumors, is known as halisteresis or osteolysis. An osteolytic process is most significant because bones are the areas of frequent metastases from cancers of the prostate, the breast, the lung, the kidney, and the thyroid gland.

Bone is a connective tissue and its primary tumors, therefore, are chiefly sarcomata which vary with the part of the bone which is principally invaded. Periosteal tumors are of two types, fibrosarcoma (involving the fibrous cells), and giant-cell osteolytic osteoma or sarcoma. The latter involve the osteoblasts. They quickly invade the bone cells and absorb and deposit bone in a patchy pattern. This pathology weakens the bones and leads to pathological fractures. These sarcomas are the commonest primary bone tumors and they occur most often in childhood and adolescence. Some believe that trauma is a causative factor. Others consider the chemical nature of the blood a factor. Martland[1] showed that primary osteosarcomas occur in bones which have become highly radioactive. The indiscriminate use of the new radioactive materials by unqualified clinicians might well bring the same sarcomatous consequences that Martland reported after autopsy of the phosphorescent dial painters in Newark, N. J.

Ewing[2] described a special tumor of early life which also is characterized by a combination of abnormal bone formation and rapid bone destruction. He believed it to be due to trauma, but it appears now that this Ewing tumor is probably a primary neoplasm of the reticuloendothelial cells of bone, for it responds very strikingly to roentgen therapy.

Pathology in the reticuloendothelial cells leads to serious defects in blood formation. Both diagnostically and therapeutically, the deleterious effects of bone destruction upon hematopoiesis are significant. This relationship also accounts for the academic disagreement about the classification of multiple myeloma. Whether it is a primary marrow cell tumor or a blood dyscrasia, or both, is less important than its clinical significance. The diagnosis of multiple myeloma, like that of all bone disease, depends upon x-ray study. Pain of rather wide distribution is the outstanding symptom, and it often precedes by some months the radiographic demonstration of the bone lesion and/or the hyperglobulinemia. A recent case illustrates this point. A female, 20 years older than the classical myeloma age of 40, was sent to James M. Eaton for pain in the lower back which was referred to the lower extremities. His examination, including the usual roentgen studies, revealed nothing of clinical interest in the bones or joints. However, since there was a hyperuricemia of well above 6 mgm. per cent, and since the patient had angina pectoris, a coronary-type electrocardiogram, and arteriosclerotic heart disease, she was placed on combined medicosurgical service. The usual treatment, including manipulation, diet, and colchicine, brought some improvement. The incessant complaining of the patient was believed to be due to a long-standing, generally recognized bad disposition, and it was easily classified as psychosomatic. Dr. Eaton applied a brace which seemed to help, and the patient was discharged. In another hospital, a few months later, a diagnosis of multiple myeloma was made by x-ray study and confirmed by marrow studies and bone biopsy. Here is a case of multiple myeloma in a woman, well into her sixties, in which the clinical picture was classical for hyperuricemia and coronary

syndrome, suggestive of clinical gout, and whose roentgen studies were negative just a short time before multiple myeloma was proved. Re-examination of the original films by Paul T. Lloyd, after the diagnosis had been established, revealed nothing suspicious, even in retrospect.

The diagnosis of multiple myeloma is made by roentgen examination of bones and is confirmed by the demonstration of abnormal plasma cells in the bone marrow and blood stream. Bence Jones proteinuria is present in less than 50 per cent of cases. The blood calcium level is variable but the phosphorus and phosphatase are normal. The blood quickly becomes anemic and the sedimentation rate is rapid. Most constant of the laboratory criteria is the hyperproteinemia with reversal of the albumin-globulin ratio.

The hyperglobulinemia is of interest diagnostically and it has shaped the rationale of treatment. Therapy, in general, has been unsatisfactory and roentgen irradiation, radioactive phosphorus, and nitrogen mustard compounds have little demonstrable effect. Antimony has been used with some success in other diseases like schistosomiasis and kala-azar, which are characterized by hyperglobulinemia. Because multiple myeloma shows a similar blood change, antimony has been tried and some success has been reported.

More beneficial in this connection, is Stilbamidine, a quinidine derivative of synthalin and synthalin B. Synthalin depletes the blood sugar, so Stilbamidine therapy should be supplemented by a high carbohydrate intake, and because of the classical hyperproteinemia in myeloma, the diet must be low in animal protein. Stilbamidine will relieve the bone pain, sometimes. Snapper[3] has reported large basophilic infusion bodies in the cytoplasm of the myeloma plasma cells after its use, but there is little or no retrogression of the radiographic pattern of malignant bone destruction.

The intramuscular injection of Stilbamidine is painful and its intravenous administration is often followed by a rapid fall in blood pressure, tachycardia, and gastrointestinal upsets. Not infrequently, vertigo and trigeminal neuritis will continue for months after the course of Stilbamidine has been completed. Like antimony, this drug decreases the hyperglobulinemia, but it does not increase life expectancy beyond the average 2 years.

Urethane, because of its occasional retardation of cell growth in carcinoma and lymphoma, has been used in myeloma. Its effects are as unpredictable and as unsatisfactory here as in all of the other malignancies. In fact, the entire chapter on therapy for primary bone tumors is a discouraging one.

On the other hand, some results can be expected in the treatment of secondary carcinoma of bone. These cancers metastasize chiefly by way of the blood stream and they are found most often, therefore, in the well-vascularized, red-marrow parts. Except in the bone metastasis of prostatic cancer, which may be osteoblastic, secondary bone cancer is principally osteolytic. Since the ribs and vertebral column are so frequently invaded, it is especially important for the osteopathic physician to check these structures radiographically as part of his routine diagnosis of cancer. Pathological fracture can result from manipulative treatment which is applied without complete understanding of the condition of the bones and joints involved.

Radiation therapy will often relieve the bone pain and will occasionally fill in the osteolytic areas. Androgenic and estrogenic materials might enhance the effects of the x-ray in this connection. In breast cancer and prostatic cancer, testosterone or stilbestrol, in large doses, will retard metastasis and reduce osteolysis. Destructive bone lesions will actually fill in, temporarily, under this treatment. Pteroyltriglutamic acid (Teropterin) can be used to supplement radiation and/or hormonal therapy. This antifolic acid actually helps to control the pain of bone cancer, and it might interfere sufficiently with the nutrition of some tumor cells to retard metastatic growth, but it produces no direct, measurable effect upon the osteolytic process.

Soft tissue osteopathic manipulative treatment of the stiff neck and rigid back that come with spinal cancer will bring relaxation and a wider range of motion to the part, but the pain is unrelieved thereby. The amount of drugs needed for the relief of pain is the same whether or not the patient receives osteopathic treatment. In this respect, bone cancer differs from some of the other malignancies.

OSTEODYSTROPHIES

A large number of interesting conditions which cause demineralization of bone are grouped under the classification of osteodystrophies. Many of these diseases are hereditary, such as osteogenesis imperfecta and chondrodysplasia; others are familial as osteitis deformans or Paget's disease. Some result from tumors, as osteitis fibrosa and Cushing's syndrome, while others are deficiency diseases such as rickets in children and osteomalacia in adults. All of them, however, are characterized by a disorder of calcium metabolism and/or a defect in bone calcification. The differential diagnosis and treatment are dependent upon the evaluation of the type and degree of the calcium and calcification defects.

Often, the diagnosis is more easily described than it is accomplished at the bedside. Laboratory aids conveniently available are blood chemistry determinations and the estimation of the calcium eliminated in the urine. By means of these tests, the so-called calcium-phosphorus balance or ratio can be quickly and fairly accurately established. There are no methods of differentiating the diffusible from the nondiffusible molecules, no criteria of determination of the fluctuating level of protein-bound or ionized calcium, no practical assay technic for parathyroid hormone, and no means of measuring or typing the available vitamin D. All of these substances, with many others, including various hormones, are related to calcium metabolism, calcium utilization, and calcium mobilization. The problem of bone demineralization from osteodystrophies is one with many subdivisions, because even normal calcium metabolism is a combination of complex biochemical ratios wherein a standard calcium intake is controlled by vegetative nervous function, vitamin utilization, and endocrine balance. No less important are the phosphorus, phosphate, and phosphatase elements concerned in the growth and destruction of bone.

Usually, the rise and fall in the blood level of calcium will be accompanied by an opposite and almost equal percentage change in the phosphorus level. One would think, then, that the introduction of one or the other of these elements into the body would correct the abnormality and have an effect upon the changes in bone. Such, however, is not the case, for under no condition will the introduction of any amount of

calcium, per se, orally or parenterally, change the blood level for longer than an hour. It is the rare case, indeed, which needs the temporary effects of the diffusible calcium mixtures which are so often used. The basic daily nutritional requirement of calcium is small and it is provided more than adequately by the average American diet.

The true deficiency diseases, rickets and osteomalacia, show normal blood levels of calcium and phosphorus, but there is improper utilization of both for bone formation. In rickets, sunlight and vitamin D will overcome the disorder, providing the child receives an adequate diet.

In osteomalacia, though it is related closely to rickets, the treatment is more complicated and much less successful. Osteomalacia occurs chiefly in multiparous females, and according to Albright,[4] it is related somehow to the menopause. It would seem then, that substitution hormonal therapy of some sort should be included. I have not seen much objective change in any case of senile osteoporosis, but I think that hygienic care and substitution therapy, to supplement the vitamin D, might retard the osteomalacia and lessen the danger of pathological fracture.

The possible relation of the menopause to osteomalacia is another angle of the significant relationship of the endocrines to calcium metabolism and bone formation. In this connection, the parathyroid glands certainly play a leading role. Osteitis fibrosa (von Recklinghausen's disease), and osteitis deformans (Paget's disease), are both due to overactivity of the parathyroid glands. Both could be the same disease in different ages and in people of different vitality, with a pathology of replacement of bone by fibrous tissue. The calcium, phosphorus, and phosphatase contents of both blood and urine are increased and the bones become decalcified and cystic in osteitis fibrosa. Calcium is deposited in other parts of the body and kidney stones are very common. Since osteitis fibrosa is usually due to parathyroid tumors, the disease occurs at an early age and the bone demineralization is so great that the deformed bones fracture from very minor trauma. Some of these cases are benefited dramatically by the surgical removal of the parathyroid tumors, most of which tumors seem to be found on the left side. Unless there is a palpable or a roentgenologically proved mass at the thyroid level, the operation should not be done, for these patients are very poor anesthetic and surgical risks. Stone formation points up their poor kidney and liver function, and the increased bone blood flow of hyperparathyroidism is conducive to congestive heart failure even if the patient is not operated upon. Not infrequently postoperative tetany follows surgical therapy of parathyroid tumor. These are grave risks and they are justifiable only after one is reasonably sure of the diagnosis. Otherwise, radiation therapy should be chosen as the basic treatment.

It might be stated here that either roentgen ray therapy is a very potent force or some cases of hyperparathyroidism are unusually sensitive to it. A patient whom I had studied for some time, a short, broad, young, married woman, was placed under roentgen treatment. Marked demineralization of the bony pelvis and of both femurs had occurred. She had been hypertensive and had a kidney stone. Her blood calcium had been high on every examination.

One evening, while she was sitting quietly at home, reading, she cried out once or twice and suddenly lost consciousness. She was admitted to the hospital, presenting the cone-shaped "obstetrician's hand" and very obvious carpopedal and leg spasms of sufficient severity to produce a fracture of the femurs and to necessitate the use of sedation. Her blood calcium level was now very low. Both dihydrotachysterol and parathormone were used to change gradually the clinical picture. Roentgen therapy had reversed the subjective and objective criteria very suddenly and without warning.

Most cases of osteitis fibrosa are caused by tumor, but a lesser number of them and most cases of osteitis deformans, or Paget's disease, are due to overdevelopment of the parathyroids or due to secondary effects upon these glands from disorders of other endocrines. In this connection, the pituitary gland assumes special importance. Bone deformities are common, and major defects are noted in the triangular head and kyphotic spine of Paget's disease. Though the blood calcium level may be unaltered, the serum phosphatase is elevated. Paget's disease responds poorly to any therapy, but its bone pain might be relieved by radiation therapy and by orthopedic devices.

The effects of other endocrinopathics upon bone are less dramatic and much less commonly seen than those which come from hyperparathyroidism. However, bone demineralization is a seldom emphasized manifestation of Cushing's syndrome and of hyperthyroidism. In these diseases, the blood calcium, phosphorus and phosphatase are normal, and the bone changes are not severe. Usually the condition of the bones will parallel the clinical condition of the patient as a whole. There is no special treatment for this part of Cushing's syndrome or hyperthyroidism beyond that which is used for the primary circumstance.

SUMMARY

From the internist's viewpoint bone demineralization can be classified quite accurately. Neoplasms which destroy bone are malignant and they are treated palliatively. Osteodystrophies comprise a whole gamut of related and unrelated disorders, all of which present defects in calcium metabolism or bone formation. Senility, disuse, nutritional deficiencies, tumors, and endocrinopathies comprise the etiological factors in this classification. Inflammations have not been discussed in this paper.

Diagnosis of bone demineralization is made by the radiologist and it is differentiated and confirmed by laboratory tests and clinical evaluation. Treatment is a matter of collaboration of the radiologist, surgeon, and internist; it is an example of the value of cooperation among specialists in several fields of practice.

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The Management of Diabetes in Pregnancy

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Diabetes mellitus is a metabolic disease characterized by a disturbance in the utilization and storage of the dextrose molecule by the body. The management of this disease in conjunction with pregnancy is to be discussed in this paper.

DIAGNOSIS

The diabetic woman who becomes pregnant and whose diabetes has been adequately controlled prior to pregnancy presents no diagnostic problem. It is in connection with the spontaneous discovery of glycosuria during the routine prenatal examination that the problem of diagnosis arises. We are all familiar with the high incidence of renal glycosuria during pregnancy and know that this in itself is not sufficient information to warrant making a diagnosis of diabetes mellitus. When a reducing substance is found in the urine during pregnancy a differential analysis of the urine should be made to identify the substance. It may prove to be fructose or pentose. Lactose is not usually found until the patient is in labor. A fermentation test of the urine and a glucose tolerance test will be required for differentiation. The history of diabetes in the family is also a valuable clue.

STATISTICS

It is estimated that in the United States at present there are at least 40,000 diabetic women of child-bearing age.[1] In the pre-insulin era maternal mortality was quite high—between 25 and 30 per cent—and the fetal mortality rate even higher.[2] Since the discovery of insulin and other hormones both maternal and fetal mortality has been drastically reduced. It must be admitted, however, that both are still above the nondiabetic rate. There are several factors responsible for these elevated mortality rates: first, toxemia is more apt to develop in the diabetic than in the nondiabetic and is more difficult to treat and control. Second, generalized arteriosclerosis is a frequent complication in older patients and increases the number of complications which influence the mortality and morbidity rate. Third, diabetic mothers have large babies, which increases the hazard from an obstetrical standpoint and must be considered when choosing the type of delivery. These common complications of diabetes will be discussed in detail.

First, let us consider the toxemia of pregnancy in the diabetic mother. Smith and Smith[3] were probably the first to recognize the hormonal relationship between serum gonadotropin, estrogen and progesterone and the incidence of toxemia in pregnancy. White and Hunt[4] subsequently studied this problem and confirmed the findings of Smith and Smith. In a large series of cases they were able to predict pre-eclamptic fetal accidents by the finding of an abnormally high concentration of gonadotropins in the blood serum after the fifth month of pregnancy. They also found that enormous doses of estrogen and progesterone depressed the gonadotropin content, and following this theory in the treatment of a series of cases, gratifying results were obtained. One series of cases reported showed a decline of fetal mortality from 32 per cent to 6 per cent. In this series of cases between 150,000 and 300,000 units of estrogen and up to 20 mg. of progesterone were used daily. It might be well to mention at this time the report of Taylor and others[5] in which it is stated that experiments have proved that estrogen and progesterone play a part in the retention of salt and water. It is believed, however, that this undesirable effect is outweighed by the marked benefit derived from the use of estrogen and progesterone.

The second complication mentioned as occurring in the pregnant diabetic was arteriosclerosis. You are all familiar with the effects of arteriosclerosis on the heart, brain, and peripheral vessels. In relation to pregnancy I believe we are more concerned with its effect on the kidneys. I believe too that it may be assumed that every diabetic is a potential candidate for chronic glomerular sclerosis—Kimmelstiel-Wilson syndrome. It is for these reasons that it is well to advise childbearing early in life before there have been too many arteriosclerotic changes and as each succeeding pregnancy increases this hazard, more than two pregnancies are undesirable.

The third complication of the pregnant diabetic to be discussed concerned the large fetus and the consequent difficult delivery. In 1936 Rynearson and Randall[6] recommended Cesarean section as the delivery of choice. However, since the advent of hormonal therapy and improved obstetrical technic, it is considered that the type of delivery should be determined by the obstetrical indication presented by any pregnant woman, whether diabetic or nondiabetic. If an anesthetic is required, some form of spinal anesthetic is the procedure of choice. In diabetic patients the new principles of childbirth without fear and pain as advocated by Reed,[7] Bubeck[8] and others are of great value.

Let us now consider the actual management of the pregnant diabetic. The patient should have a very complete physical examination, including chest x-ray, basal metabolism test, blood chemistry determinations, particularly for the evaluation of renal and hepatic function, and the usual blood sugar and cell count determinations. If the patient is 30 years of age or over it is well to have an electrocardiogram and an x-ray of the pelvis and extremities for signs of arteriosclerosis. It might be well at this time to mention that very close cooperation between the obstetrician and the internist is required in the management of these cases and that the eventual outcome of the pregnancy depends largely on this cooperation.

After the physical examination, consideration of the diet and insulin must be given. I prefer a diet containing 200 to 250 grams of carbohydrate and 1.5 to 2 grams of protein per kilogram of body weight, with fat adjusted to meet the total caloric requirement. It is well to calculate the diet to allow for a 2 pound weight gain per month. If the physician has been regulating the patient's diet prior to pregnancy, he will find that the caloric requirement during gestation will increase from 15 to 20 per cent over the pregestation period. Beginning with the third month liberal quantities of calcium should be supplied. One of the best sources is from dairy products. One quart of milk and

2 ounces of cheese daily can easily be incorporated into the diet. This adds 50 grams of carbohydrate, 50 grams of protein, and 60 grams of fat. If this increases the fat content too greatly, butter and cream can be reduced and cheese of a low fat content used.

During pregnancy the insulin dosage will usually increase. My choice is protamine zinc insulin, with or without regular insulin, depending on the individual case. If the fasting blood sugar tests are high and the postprandial blood specimens show less than 150 mg. of glucose, the patient is controlled on protamine zinc insulin alone. If the fasting blood sugar levels are low or if night insulin reactions are experienced with the use of protamine zinc insulin alone, the dosage of the protamine zinc insulin is reduced and regular insulin added. It can be mixed with the protamine zinc insulin, using a 2:1, 3:1, or 4:1 ratio. By using a mixture of regular and protamine zinc insulin, the activity time of the regular insulin is increased, and by reducing the number of units of protamine zinc insulin the delayed action through the night is reduced. It is also well to remember that any patient receiving protamine zinc insulin should have a bedtime lunch, consisting mainly of protein, to serve as a buffer through the night to prevent hypoglycemia. While mild hypoglycemic reactions are not serious, it is very desirable that they be avoided as much as possible.

Diet and insulin, with frequent and careful observation of the patient, should in the majority of cases present the obstetrician with a fairly normal patient at the time of delivery. During labor the patient is allowed fruit juices, thin cereals, milk, and tea. No attempt is made to maintain the measured diet and no protamine zinc insulin is used. Urine specimens are examined every 6 hours, and if glycosuria is present very small doses of regular insulin are given, 10 units usually being sufficient. This procedure is followed because of the fact that immediately following delivery the carbohydrate tolerance suddenly improves and insulin requirements diminish quickly. Acidosis, therefore, need not be feared during labor. The improved carbohydrate tolerance will usually last the first 3 to 5 days of the puerperium, after which the insulin requirement rapidly returns to the pregestational level. Collens[9] suggests that this phenomenon is due to the rapid involution of the pituitary gland following pregnancy as is indicated by the disappearance of the acromegalic features of pregnancy within a week after its termination. During the puerperium blood sugar and urine sugar must be watched carefully so that the diet and insulin can be regulated as required. Until the return to the true diabetic state, that is, during the first 3 to 5 days of the puerperium, 5 units of regular insulin given three times daily will usually suffice.

Lactation: Diabetic mothers lactate poorly and I do not advise them to nurse their babies. Artificial feeding is now quite satisfactory, and it has been my experience that the artificially fed infants do much better than those nursed by diabetic mothers. While on the subject of feeding the infant, the condition of hypoglycemia following delivery is brought to mind. Randall and Rynearson[6] reported observations on newborn children of diabetic mothers which suggest that such infants may at first have hyperactivity of the islands of Langerhans and are subject to spontaneous hypoglycemia. For relief of this condition they recommend heat, oxygen, and intramuscular injections of 5 cc. of 10 per cent glucose in each buttock, every 4 hours. Feeding is attempted early: 10 cc. of a 10 per cent solution of dextrose is given every 2 hours for the first 48 hours. If tolerated, feeding is preferable to intramuscular injections. However, if the feeding is taken poorly, or whenever twitching, convulsive movements, or cyanosis indicate the development of hypoglycemia, glucose must be administered intramuscularly. The condition is usually corrected within 48 hours.

SUMMARY

The diagnosis and incidence of diabetes in pregnancy have been discussed. The results of recent hormonal therapy in the prevention of fetal deaths has been reviewed. The management of the pregnant diabetic in the prenatal period and during labor and the puerperium have been outlined, as has been the care of the infant following delivery.

1239 Fulton St. E.

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THE BEHAVIORAL RESPONSE OF PATIENTS SEIZED WITH AN ACUTE MYOCARDIAL INFARCTION

. . . I believe that a distinction can be made between the pain of angina pectoris and that associated with a coronary occlusion on the basis of the inherent behavioral response of the individual to his pain. The patient with angina pectoris characteristically has his pain on effort, and the instinctive response to this pain is cessation of all effort and motion. On the other hand, the patient seized with a coronary occlusion is frequently at rest although he may be at work, and his instinctive response to this pain is effort lasting from five minutes to several hours. . . .

An understanding of the usual behavioral response of a patient with a coronary occlusion is also helpful in distinguishing a genuine occlusion from a simulated occlusion. Those patients whose symptoms are motivated either by obvious malingering or on a more subtle neurotic basis usually convey the idea to the examiner that their pain causes complete and immediate cessation of all activity. The neurotic or malingerer will not show activity following the onset of his pain.—Stuart W. McLeod, M. D., *Annals of Internal Medicine*, April, 1949.

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The Meningitides or Diseases of the Meninges

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MALFORMATIONS

Although meningeal malformations have little bearing in the comparative therapeutics of the meningitides, they do have some importance to the osteopathic physician in the manipulative and surgical fields. Congenital malformations of the meninges commonly accompany some bony anomaly of the spinal column such as spina bifida. The most common meningeal malformation is incorporation of the roots of the cauda equina which leads to nerve degeneration, particularly of the posterior roots. In mild cases, this condition may not produce symptoms until adult life and then may resemble tabes dorsalis, fracture, or disk pathology. It is therefore necessary for us, as osteopathic physicians, to keep congenital anomalies in mind in the differential diagnosis of low-back problems.

NEOPLASMS

Neoplasms, such as sarcoma, may originate in the dura mater, usually at the base of the skull. Early in their course they may resemble brain tumor with involvement of the cranial nerves. Malignant growths may also extend into the dura from the vertebrae and surrounding structures. These conditions are usually localized in the early stages and are usually found on referral to the neurologist or neurosurgeon. Therapy is directed primarily toward surgical removal, radiation, etc., as advised by the neurosurgeon. Osteopathic manipulative treatment, judiciously applied, has a definite place in the inoperable cases for relief of pain; this therapy can definitely postpone the time when analgesics, and finally narcotics, must be used.

HEMORRHAGE

Hemorrhage into the meninges usually occurs subdurally and is invariably the result of trauma. The treatment is primarily surgical but should also be directed toward correction of any elevated blood pressure or hemorrhagic tendencies when they are present.

INFECTION

Infection is by far the most common disease of the meninges encountered in practice. This may originate from the blood stream or lymphatics, or by direct extension from the nasopharynx, sinuses, mastoid, or following compound skull fracture.

In any of the infections the first step in ideal treatment is to isolate and identify the offending organism in order to use the sulfonamides or antibiotics more scientifically. This diagnostic measure can usually be carried out by the conventional spinal tap and smear and culture of the fluid withdrawn. Further studies of the cell count, sugar, chloride, and protein content of the fluid may provide diagnostic aid. However, the tap procedure may not be successful in diagnosis of extradural abscess, thrombosis of a venous sinus, or isolated tuberculous patches on the exterior of the dura.

In meningeal infections secondary to constitutional diseases such as puerperal sepsis, typhoid fever, gonorrhea, and pneumonia specific antibiotic treatment of the primary pathology is indicated. These secondary types of meningitis should and will continue to decline in incidence and severity with proper and early specific antibiotic treatment of the primary infection.

In the specific infections of the meninges caused by staphylococci, streptococci, pneumococci, meningococci, or Treponema pallidum, penicillin is the indicated antibiotic. Any failure to improve or any relapse under therapy where one of these organisms has been found present dictates the following procedure: recheck of the culture, laboratory check of organism sensitivity, increased dosage, and more thorough search for the primary focus of infection, as in the mastoids, sinuses, or middle ear.

Tuberculous meningitis is best combated with streptomycin alone or with promizole or para-aminosalicylic acid. Based on his experience Yampolsky[1] has found that promizole and dihydrostreptomycin seem to be the agents of choice because of their low toxicity and relative safety for use over as long a period as is quite often necessary in tuberculous meningitis.

The customary treatment of pneumococcic and meningococcic meningitis is 200,000 units of penicillin per day systemically and 10,000 to 20,000 units intrathecally. The same daily dosage of penicillin systemically is used together with sulfadiazine or sulfamerazine 1½ grains per pound of body weight per day. Under this program 51 per cent of the cases recover.[2] A series of 21 cases has been reported[3] in which the patients were treated with penicillin in doses of 1,000,000 units every 2 hours. Three of these patients who were in coma or *in extremis* received intrathecally only an initial 20,000 or 25,000 units of penicillin. In this series, the death rate was 38 per cent compared with the 49 per cent which is to be expected under customary treatment. Further study of this series showed a more rapid temperature drop, less incidence of recurrence of fever, and a decided decrease in the duration of pleocytosis.

Goodfriend and Thurston[4] at the St. Louis Children's Hospital, because of frequent uncertainty of the identity of the organism on cerebrospinal fluid examination, possible mixed infection, and the impossibility of rapid determination of bacterial sensitivity to the various agents, set up the following practice—if at their first tap they found a cloudy fluid, they promptly administered penicillin and streptomycin intrathecally and subcutaneously and occasionally began sulfonamides simultaneously. Blood and spinal fluid for cultures were obtained prior to the institution of this combined therapy which was continued daily intrathecally and systemically until the organism was identified and its sensitivity determined. The ineffective agents were then discontinued.

However, Yampolsky,[1] in his discussion of influenzal meningitis states that patients with meningitis due to Hemophilus influenzae may be treated with streptomycin alone with reasonable assurance that they will get well. He further states that it has been found by others that when the organism becomes streptomycin-fast, it may show some sensitivity to penicillin. Therefore, the use of the two antibiotics simultaneously is inadvisable. He quotes Weinstein[5] as saying that when the two drugs are used individually, after eradication of the particular organism, new organisms can be isolated from the nose and throat which did not ap-

pear in the original bacterial study. For this reason Weinstein emphasized the need for intensive bacterial study not only before but also during antibiotic treatment and he especially emphasized the fact that the combined use of streptomycin and penicillin should be avoided at the beginning of treatment.

Yampolsky[1] includes in his study details of the treatment of meningococcic, pneumococcic, and tuberculous meningitis as well as that for influenzal meningitis. Concerning meningococcic meningitis he says that the main reason for the failure of treatment today is delay and that if treatment with penicillin, intramuscularly and intrathecally, and sulfadiazine is instituted early enough, it will prove beneficial. He believes that the failure to obtain good results in pneumococcic meningitis is primarily due to difficulty in locating and eradicating the primary focus of infection and that while drugs available at present are inadequate for treatment, penicillin is useful and may be used over a long period without producing many penicillin-fast organisms, thus allowing opportunity for search for the location and for the eradication of the primary focus of infection. In his treatment of influenzal meningitis he has relied chiefly on sulfadiazine and streptomycin. He has used Alexander's rabbit in only two cases at the time of his report and although no improvement resulted because of spinal block he believes that there is no question of the value of the serum. However, the difficulty and expense connected with its use lead him to believe that the simpler methods of treatment are more likely to continue to be used. Yampolsky's conclusion about tuberculous meningitis is that while streptomycin and promizole are promising, additional chemotherapy which will not result in resistance to these drugs must be looked for. Para-amino-salicylic acid, which has been used in recent months, may provide the help that is being sought.

Hoyne[6] working in Cook County Hospital and Municipal Contagious Hospital in Chicago, recently published an article which is receiving quite a bit of thought and consideration by the medical profession. The essence of his report is as follows: Since 1934, several thousand patients with meningitis due to many different organisms have been successfully treated without intrathecal therapy. It has been demonstrated that lumbar punctures for drainage are not beneficial to the patient and repeated punctures as an index to prognosis are not required. His objections to intrathecal therapy are listed as follows: discomfort and pain; tendency to produce opisthotonos; uncertainty as to effective dosage; possibility of secondary infections from repeated spinal punctures: possible injury to intervertebral disks; hemorrhage or thrombosis of vessels producing degenerative changes in the spinal cord; possible production of adhesions, blocks, and hydrocephalus; slower recovery; greater likelihood of relapse; and failure to lower fatalities. His conclusion is that the procedure is unscientific as it has no advantages and is accompanied by hazards.

In meningeal infections the illness is acute and, as stated, the proper bacterial etiologic diagnosis followed by the most suitable antibiotic is the primary point of the treatment. The proper application of osteopathic manipulative treatment at this point is secondary but nonetheless beneficial. With a favorable outcome of the active infection, the manipulative treatment to aid circulation within and about the spinal structures assumes increasing importance. Patients who have recovered from the acute process but who have some residual paralysis or radicular pains obtain relief and have their recovery hastened by such treatment.

The adoption by members of the allopathic profession of manipulative treatment of acute anterior poliomyelitis is an admission on their part of the beneficial effect of this type treatment in infections involving the spinal cord. I do not think they feel this mode of treatment is specific for the polio virus, but I do think they have found it of definite use in infection and/or inflammation in or about the spinal cord.

In the chronic conditions such as the results of trauma, myelopathy and sclerosis osteopathic manipulative treatment is of primary importance in the effort to prevent progression of the disease process. In these conditions, prostigmine and curare or its derivatives are of distinct help in overcoming spasticity while manipulation and exercises are being used. However, this effect persists only while the drug remains in the body in sufficient strength to produce relaxation of the spastic muscle and the primary thought in treatment must be to increase spinal movement and improve circulation to the spinal segments involved.

CONCLUSIONS

In infections of the meninges it is of utmost importance to make the bacterial etiologic diagnosis before institution of therapy. There appears to be some trend away from repeated taps and intrathecal administration of the antibiotics; rather a higher concentration of systemic antibiotic therapy appears to lessen recurrence, hasten recovery, and produce a lower incidence of complications.

The drugs now available for the therapy of meningitis include sulfadiazine, penicillin, streptomycin, dihydrostreptomycin, promizole, and para-amino-salicylic acid. Good response is found in meningococcic meningitis with penicillin and sulfadiazine and in influenzal meningitis with sulfadiazine, streptomycin, and possibly Alexander's serum; fair response is met with in pneumococcic meningitis from the use of penicillin and streptomycin and in tuberculous meningitis with streptomycin and promizole and possibly with para-amino-salicylic acid. Osteopathic manipulative therapy has a definite place in the therapy of diseases of the meninges.

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Differentiation of Myocardial Infarction Complicating Heart Block

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In order to get an over-all picture of our problem the general relationship between myocardial infarction and heart block will first be discussed. In 14,000 electrocardiograms taken at the Massachusetts General Hospital over a 19-year period, only 72 cases of complete auriculoventricular heart block were seen.[1] In only 6 cases was myocardial infarction the etiological factor. Forty-seven of the 72 cases were the result of chronic coronary artery disease associated with hypertension in 25 cases. In only 1 of the 72 cases was the heart block complicated by myocardial infarction. Smith[2] and Lyons[3] in separate reports make the statement that coronary occlusion with myocardial infarction rarely occurs in complete auriculoventricular block. In 572 cases of coronary occlusion with myocardial infarction reported by Mintz and Katz[4] there were only 5 instances of complicating complete auriculoventricular block. Lesser grades were more common, there being 23 first degree and 11 partial blocks. These findings are similar to those based on a series of 375 myocardial infarctions complicated by auriculoventricular blocks reported by Master, Dack, and Jaffe.[5] In the series reported by Mintz and Katz[4] there were 72 cases of intraventricular block or almost double the number of auriculoventricular blocks.

In both these series of cases[4,5] the auriculoventricular blocks tended to vary in degree from partial to first degree, complete to partial, et cetera, and for the most part they were transitory. The fact that during serial electrocardiograms, the degree of auriculoventricular block varies or is transitory would lead to the conclusion that the block had not been present prior to the myocardial infarction but was a concurrent development. If on the other hand the block did not vary in degree and was permanent, it might be assumed that the block had been present prior to infarction, especially if there was an associated hypertension and the patient was receiving digitalis. However, this would not always be true.

A finding that may be of differential diagnostic aid has been reported by Rosenbaum and Levine[6] and by others: It has been found that the great majority of cases of myocardial infarction complicated by heart block are of the posterior wall type, resulting usually from an occlusion of the right coronary artery, because the auriculoventricular node and bundle receive their major blood supply from that vessel.

I have in my files a history of only one case of heart block complicated by myocardial infarction. It occurred in a 64 year old male who presented himself for examination because of shortness of breath. He gave a history of severe substernal pain 14 months previously, which lasted for 2 hours, and which had necessitated a "shot" to relieve the distress. He was told at that time that he had suffered a heart attack and was confined to bed for 8 weeks. The chief complaint when he was seen by me was dyspnea on slight exertion which had been present for about 3 months. On examination the pulse was found to be 38 and regular. He was normotensive and the left border of the heart was at the left anterior axillary line. An electrocardiogram revealed complete auriculoventricular block and a Q_3 T_3 pattern. The patient was digitalized, placed on a maintenance dose of digitalis, and advised to restrict his activities. He noticed some improvement in his dyspnea, but expired 2 months later within 20 minutes following the onset of acute substernal pain. Time did not permit another electrocardiogram, nor was an autopsy performed, but clinically this was a case of myocardial infarction complicating heart block.

The diagnosis of myocardial infarction complicating intraventricular block requires serial electrocardiograms in which the expected evolution of the S-T-T is seen, distorted, of course, by the widened QRS and abnormal T waves. It is an aid in diagnosis, when deep Q waves are found in Leads I and II and the chest leads. Often the differentiation of complicating myocardial infarction is not possible in intraventricular block, especially in a stabilized anterior wall type associated with the common form of intraventricular block. The only incidence in my own experience in which myocardial infarction complicated intraventricular block was in a middle-aged physician with angina pectoris and no history of previous occlusions. His electrocardiogram disclosed a so-called left bundle branch type of block. He died of an acute coronary occlusion 2 years following his first visit to my office. The diagnosis in this case was also clinical, as the patient died in a few minutes after complaining of extreme shortness of breath.

In summary and conclusion it may be stated that myocardial infarction is more commonly a cause than a complication of heart block. However, it is often impossible to make a differentiation as to which came first.

About the only method of making the differential diagnosis in more cases would be making routine electrocardiograms in individuals over 40 years, in which case the functional condition of the conduction system prior to the occurrence of myocardial infarction would be known.

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Current Medical Literature

PRACTICAL CONSIDERATIONS IN THE CONSERVATION AND REPLACEMENT OF BLOOD IN SEVERE HEMORRHAGE

Simple management of patients with blood loss rapid enough to cause symptoms of upset relationship of blood volume and vascular capacity is described by Leandro M. Tocantins, M. D., in the *Medical Clinics of North America*, November, 1949. The primary considerations in behalf of a patient in severe hemorrhage are:

1. Conservation of the blood remaining in the body by reducing or checking further loss and devising ways to use blood still in the circulation to best advantage.

2. Immediate estimation of the urgency and extent of the need for blood replacement and the decision of the quantity of blood or other fluid to be given and the rate of transfusion or injection.

3. Constant close observation of the patient and correction of systemic hemostatic defects or other dysfunctions.

Measures to conserve the blood are rest, adjustment of posture to lessen bleeding and to keep the brain and viscera supplied with blood, and compression of the bleeding area by tourniquet, dressing, or direct pressure. Tocantins stresses the importance of a slow release of compression which prevents too sudden a rise of pressure in the vessels which might reopen the wound. A rapid application of pressure and slow release, repeated several times, sometimes will promote hemostasis. Vasoconstriction in the extremities temporarily adjusts the vascular capacity to the limited blood volume. The central organs—brain, heart, liver, and kidneys—can be supplied with blood by lowering the head and chest, applying compression bandages to the limbs and lower abdomen, and lifting the legs above the heart level. Applications of heat to the body are to be avoided, since vasodilation, increased vascular capacity, and accelerated metabolism all exaggerate the limited volume capacity.

After hemorrhage the need for blood may or may not be urgent. If transfusion is not necessary, it can likewise be injurious, overloading the circulation and resulting in pulmonary edema, et cetera. Blood pressure, with the other considerations, is a good index to transfusion. For example, with the symptoms of shock, a known blood loss of 1 per cent of the body weight, and a blood pressure under 100 mm. of mercury, a transfusion of the amount lost may be given and the patient observed for hemostasis and rise of pressure before further transfusion is attempted. If the bleeding stops, the mercury usually rises 10 to 20 mm. in adults for each 500 cc. of blood transfused. Fifty per cent of the calculated blood loss transfused should bring the blood pressure to 100 mm.

The rate of transfusion is important. It can be as rapid as 20 to 40 cc. per minute, if the pressure is under 50 mm. When the pressure has risen to 70 to 80 mm., 10 to 15 cc. per minute is adequate. At 100 mm. or over, 6 cc. per minute is as fast as it should be injected.

If measuring blood pressure is impractical, the *quality* of the pulse will indicate the pressure—a thready, not easily compressed pulse, the high systolic blood pressure and narrow pulse pressure; a full, compression-resistant pulse, a high systolic pressure and wide pulse pressure; a thready, easily obliterated pulse, a drop in systolic and diastolic pressures; bounding easily compressible pulse, a lower systolic pressure with wide pulse. These latter two types indicate impending circulatory collapse. Experience in judging pulses and a knowledge of pre-existing disease will assist the physician to evaluate this evidence. A moderate hypotension in young well-hydrated patients may assist hemostasis, naturally. Transfusions should be given promptly to patients with hemostatic disorders, especially if the hemorrhage has been severe and continues.

Distention of the jugular veins and the superficial veins indicates a circulatory fluid plethora. If the patient is conscious, other indications of too much or too rapidly administered fluid are substernal oppression, abdominal or lumbar pain, and breathlessness and anxiety.

Whole blood is preferred for transfusion in acute hemorrhage, then plasma, albumin, gelatin, 5 per cent glucose and physiological saline. Plasma cannot be expected to correct the blood deficit. A transfusion of 500 cc. of whole blood should supplement every 3 pints of plasma. Unmodified blood sometimes succeeds when fresh, citrated blood has not. In the presence of incompatibility reaction, transfusion should be discontinued. Continuation of bleeding is responsible for failure of the pressure to respond to transfusion. Unless other reasons for hypotension exist (psychogenic, endocrine), the bleeding may be assumed to persist if the amount of transfused blood necessary to bring the blood pressure to normal exceeds the amount of blood lost.

For at least 72 hours after a patient who has undergone severe hemorrhage has recovered from shock, he should be watched. Provision against the repetition includes available plasma and whole blood, a needle kept in the vein, and frequent determinations of the blood pressure. Repetition of the shock state several times within a 12-hour period should prompt the physician to check the bleeding area.

Oxygen is indicated for cyanosis. Adrenocortical extract may be effective, if response to the usual measures for circulatory collapse has not been good. Oliguria may need some measure such as intravenous hypertonic glucose solutions to normalize the flow of urine. Nutrition should not be neglected. Well-hydrated tissues are desirable.

MOTOR ATTITUDES AND PSYCHOTHERAPY

Edward Ascher writing in *Psychosomatic Medicine* for July-August, 1949, states that Freud's discovery of the emotional significance of seemingly meaningless acts has provided the psychiatric practitioner with a new technic to learn about his patient's emotional conflicts and personality functioning.

Prior to this dynamic concept of motor behavior, the motor activities of a patient, particularly the chronically psychotic one, were considered to be purposeless and unmotivated. Extensive psychological studies, however, have favored the hypothesis that there are organized psychomotor dispositions or expressive traits.

In the course of development of psychoanalysis as a technic of uncovering emotional conflicts, observation of symbolically significant motor expression was subordinated to the interpretation and study of verbalized productions. More recent observations in the course of treatment of schizophrenia contributed to the understanding of the meaning of certain stereotyped movements as being defense reactions against rebuff in instances when the patient's friendly feelings called for a favorable response on the part of the therapist. The conclusion was reached that every person had a characteristic postural pattern which represented the response of his motor apparatus to unconscious psychological complexes.

In the course of treatment of patients hospitalized at the Henry Phipps Psychiatric Clinic over a 3 year period, the motor behavior offered valuable clues regarding the emotional conflicts and themes which had bearing on the personality functioning. Case abstracts described motor behavior expressing such attitudes as dependency, the manic's caricature of expressing hostility, regression, need for self-control, urge for control of the environment, marked ambivalence, preparedness for action, psychotic withdrawal, and others.

A fairly detailed history of motor behavior should provide a useful basis for future comparison and evaluation in addition to offering valuable information on the psychodynamics of the case. Greater awareness of the importance of motor behavior in personality functioning is indicated.

ANTHONY DINOLFO, D.O.

BLOOD TRANSFUSIONS AND THE RH FACTOR

Paul G. Hattersley, M.D., in *California Medicine* for May, 1949, advocates Rh typing as a routine pretransfusion procedure and the maintenance of a source of Rh-negative blood for transfusions for Rh-negative patients, because of the serious hazard of sensitization of the Rh-negative patient by transfusion.

Severe hemolytic disease in infants born to Rh-negative women sensitized by transfusion of Rh-positive blood is a recognized clinical entity. The history of such a patient may reveal that the sensitization occurred from a transfusion received in childhood or infancy. It has been demonstrated that even though the antibody may not be detected in the blood, re-exposure to the Rh antigen produces the antibody promptly. In addition to the precaution of prohibiting Rh-positive blood transfusions to Rh-negative-type women before menopause, it should be recognized that male Rh-negative patients, too, react to transfusion with Rh-positive blood with acute symptoms of sudden chill, substernal or lumbar pain, drop in blood pressure sometimes to shock levels, and urinary suppression and uremia. However, these characteristic symptoms may be lacking or minimal. Hattersley does not agree with the theory explaining the lack of acute symptoms by slow hemolysis of the transfused cells.

The author reports a case to illustrate that asymptomatic hemolytic reactions occur very rapidly. His patient had been sensitized 6 months prior by a single transfusion of 1 pint of blood. The routine cross match technic, in common use, did not reveal the hyperimmune type of Rh antibody from sensitization by previous transfusion. Hemolysis of the entire transfusion was completed within 2 hours without the usual symptoms. Hemoglobinuria and icterus were slight enough to escape notice until the laboratory tests advised of their presence. The author states that the incidence of hemolytic reactions to incompatible transfusions undoubtedly would be reckoned differently if determined by the subsequent hemoglobinemia, hemoglobinuria, low-grade icterus, and urobilinogenuria rather than by the obvious signs. Such transfusions do not accomplish their purpose of elevating the hemoglobin.

In support of Hattersley's advocacy of routine Rh typing are the following considerations: (1) Transfused blood, if incompatible, does the patient no good. (2) Possible permanent renal or hepatic damage may ensue. (3) Incompatibility may result in death with the patient in shock or in renal failure.

There is not sufficient knowledge available to substantiate the amount or kind of injury to the liver and kidneys if the transfusion has been asymptomatic, nor is there any way yet discovered to predict which Rh-negative patients will react with the acute classic hemolytic syndrome. Until such facts are ascertained, the risk can be avoided simply by routine use of reliable Rh-typing technics, Rh antisera, and Rh-negative blood when indicated.

TONSILLECTOMY IN THE ALLERGIC CHILD

Ben F. Feingold, M.D., in *California Medicine*, November, 1949, recommends competent management of the allergy in the child with nasopharyngeal difficulties possibly attributable to allergy. The decision to perform tonsillectomy and adenoidectomy is easily made if obstruction exists. Otherwise, the basis is the presence of infection, since the interaction of allergy and infection aggravates edematous enlargement, in many instances. Management of the allergic state often controls the symptoms of both infection and allergy, while it has been observed that tonsillectomy and adenoidectomy can increase allergic manifestations. Operation is indicated, in the presence of infection, if there is no response to attempts to control the allergy.

A valid objective criterion of infection is not size, since nasopharyngeal lymphoid tissue is abundant in prepubescence. Dark red discoloration, marginal thickening of the anterior pillars, a cheesy exudation from the tonsillar crypts, and cervical adenopathy are symptoms often used as criteria. Feingold considers the history the most reliable index. If upper respiratory infections involving the tonsils and adenoids continue recurring after the allergy has been under treatment, there can be no doubt that the patient should be operated upon.

The course of infection imposed on an existing allergy is affected by the fact that tissues are hypersensitive and by one of two patterns of influence. In one, at the onset of an acute infection such as pertussis, measles, mumps, chickenpox, roseola infantum, Kaposi's disease, and various viral infections, the allergy becomes aggravated. As the disease approaches its climax, the allergic manifestations drop sharply and reappear more intense than ever during the convalescence. In the second pattern, the level of allergic reaction follows closely the body's reactivity throughout the course of the attack. When the infection has responded to treatment, the allergic situation subsides to a level slightly higher than formerly. If infection recurs, the allergic reaction increases and intervals between these infectious episodes become shorter. This pattern of recurrent infection with the tonsils and adenoids implicated is considered sufficient indication for surgery.

Following the operation, the allergic condition will still need attention, despite the temporary immediate subsidence of symptoms.

TREATMENT OF ACUTE LEUKEMIA WITH FOLIC ACID ANTAGONISTS

Using animopterin and a-methopterin, chemically closely related to folic acid, but acting biologically as antagonists, J. Minott Stickney, M. D., and others report the results of their treatment of 21 children and 33 adults with acute leukemia in the *Proceedings of the Staff Meetings of the Mayo Clinic*, October 12, 1949.

The diagnosis was determined from examinations of blood and marrow. Blood transfusions were used when there was hemorrhage or the anemia was severe. If infection or severe leukopenia so indicated, antibiotics were used. The substance mostly used was aminopterin, 1 mg. intramuscularly or orally daily, discontinued at the occurrence of symptoms of toxicity. If smaller doses could be tolerated thereafter, they were maintained. The reaction to treatment was considered favorable if the degree of cell immaturity in the blood and marrow decreased. On occasion normal peripheral blood was established, but not normal bone marrow. In some patients the high leukocyte count was normalized, as were hemoglobin and erythrocyte count. Size of the spleen and nodes was affected for the better. The pain and swelling in leukemic arthritis decreased. Bone involvement, observed by x-ray, was arrested or even decreased. The improvement for tabulation purposes was labeled as partial remission if the clinical condition of the patient was improved or the character of blood and marrow. If the remission was called complete, both were changed for the better. No remission was ever permanent, and all living patients observed now have leukemic blood. The response in children was better than in adults. Remissions endured as long as 4 months. Of the children 5 of 21 had complete remissions, the adults 3 of 33.

The authors point out that the results are discouraging but even so show better effects than therapeutic agents thus far used.

PERIODIC DISEASE

Hobart A. Reimann, M. D., collected over 50 cases of periodic disease, conditions which may be unrelated but more than likely manifest a similar or identical etiology. In the *Journal of the American Medical Association*, September 17, 1949, where he has presented 22 histories in some detail, Reimann names and groups such cases with the descriptive adjective "periodic" thus: Periodic fever, periodic abdominalgia, periodic arthralgia, periodic neutropenia, periodic purpura, periodic thrombopenia, periodic edema or urticaria, and periodic paralysis.

Of 53 cases from the literature and from Reimann's records, 36 were males, 17 females. Duration of the cycles is similar. Symptoms vary but overlap. Occurrence is predictable over many years. When the episodes have become established,

they persist. Most patients are ambulatory during the attack, except those affected with periodic paralysis. Between episodes the health is generally good. Onset often is found in infancy, but the clinical appearance of the symptoms may be delayed until late in life. Siblings are affected, and familial groups have been recorded. Ethnic factors are questionable.

The cause is unknown. Proposed explanations have included infection, allergy, endocrinologic or nervous influences, or some as yet inexplicable intrinsic or extrinsic cycle. Most of these have been ruled out. Certainly, heredity is a factor. The clinical symptoms may be traced to vasomotor behavior. Periodicity, until more adequately understood, may be attributed to an obscure connection with the rhythmic cycles of life itself.

CARCINOMA OF THE BREAST

In an effort to perceive the possible significance of the menstrual cycle in the results of mastectomy, Frank R. Ruff, M.D., presents in *California Medicine*, October, 1949, a small series of 55 cases with a positive diagnosis of cancer, operated over a 4 year span. These patients were under the age of menopause. The time of the operation could be established as taking place in designated periods, the first being the 7 days before menstruation, the second the first 7 days after the beginning of menstruation, the third the eighth through the fourteenth day, and the fourth the fifteenth through the twenty-first day.

Information about the grade of malignancy was not available nor about the extent of the lesion. Several surgeons performed the operations. The ages of the patients differed, results being more favorable among the younger ones. Time of follow-up could not be uniform. The series admittedly is small.

The figures show a low percentage of metastasis among those operated in the first period (26 per cent), increasing to 60 per cent in the second period, 63 per cent in the third, and 86 per cent in the fourth. Similar evidence of increase in mortality is presented through the four periods, progressing from a low of 13 per cent in the first period, 20 in the second, 37 in the third, and 64 in the fourth. The author states that even taking into consideration the possibility for variation and error these figures indicate that there may be a time for surgery (the days immediately before menstruation) when metastasis and mortality are less likely to result.

Ruff suggests studies of a larger series of cases with the inconstant factors mentioned resolved should be undertaken by doctors with access to good records.

TREATMENT OF ACUTE RHEUMATIC FEVER AND PREVENTION OF RECURRENCES

Dividing rheumatic fever into five phases, the invasion of the inciting agent, latency between invasion and development of symptoms, acute activity, subacute activity, and inactivity, Robert L. Jackson, M.D., in the *Journal of the American Medical Association*, October 15, 1949, discusses the protean and recurrent aspects and his recommendations for therapy and control of the disease. Once the stage is evaluated, treatment should be prompt to mitigate the attack and to avoid cardiac involvement, if possible.

Almost invariably hospitalization is required. Anxiety, and emotional fatigue and insecurity must be offset by adequate parental substitutes. Minimum necessities are complete bed rest, cleanliness, sunshine, security, and fortified nutrition with small amounts of food frequently taken. The best diet is high in protein and low in fats. It includes 5,000 units of vitamin A, 400 units of vitamin D, 100 mg. vitamin C, the latter preferably in food. During acute illnesses, the amount of vitamin B complex intake should be double the allowance recommended by the National Research Council for normal persons. Fluid intake must be sufficient to assist in the utilization of salicylates and digitalis. The possible value of blood transfusions is discussed.

The author uses acetylsalicylic acid, 0.7 grain per pound of body weight each 24 hours in 6 doses, watching for symptoms of toxicity and controlling the blood to guard against acid-base imbalance and hypoprothrombinemia. Enough of the drug should be given for good antipyretic and analgesic effects. The adrenocorticotropic factor may eventually be utilized in therapy. Studies have been too limited and the substance too expensive for present utilization. If the patient's heart is involved, Jackson uses digitalis. If there is failure or impending failure, he advocates diuretics in frequent small intramuscular doses until the congestion is relieved. None of the antibiotics now known alleviate the course of the disease. As there is evidence that the sulfonamides produce exacerbations during acute activity, penicillin is the choice for treatment of superimposed infection.

During convalescence the emotional, intellectual, and spiritual needs of the patient are as important as the physical. A sanitorium rather than a hospital can best be adapted for the combined nursing and teaching care desirable. As the patient improves and activity can be resumed, the home environment should be surveyed by a trained medical social worker. Recurrences and deaths are frequent in poor home environments. The economic status is not so important as the social integrity of the home. Disruptions of selfishness, drunkenness, promiscuity, divorce, et cetera are not so easily corrected as impoverishment.

ROLE OF BLOOD PLATELETS IN THROMBOEMBOLISM

Sylvan E. Moolten, M.D., and others have reviewed the concepts of thromboembolism in the *Archives of Internal Medicine*, November, 1949, and they interest themselves most especially with the role of the platelet. After a discussion of thrombocyte physiology, normal and altered, they reach the following conclusions:

1. An adherent plug of massed platelets is the first event in thrombosis.

2. Thrombocytosin, a lipid of body fat liberated by trauma (surgery, fractures, etc.), tissue breakdown (myocardial infarction, carcinoma, etc.), or after ingestion of animal fat, causes an increase in number and adhesiveness of platelets.

3. Thrombocytopen which is formed by the spleen is a physiologic antagonist of thrombocytosin, suppressing platelet formation and adhesiveness.

4. Rapid diminution of a previously high platelet count of adhesive nature may be a method of preclinical recognition of thrombosis. A new method of measuring platelet adhesiveness is described and it is suggested that predisposition to thrombosis may thus be determined.

5. Heparin lowers platelet adhesiveness, Dicumarol is much less effective, and thrombocytopen causes both a diminution in platelets and adhesiveness. This may be significant in prophylaxis and also suggests that deficient splenic function may predispose to thrombosis.

MORTON TERRY, B.A., D.O.

MYOCARDIAL INFARCTION

Observations on one hundred patients who survived 1 to 6 years after acute myocardial infarction are reported by G. Y. Mills and others in the *Archives of Internal Medicine*, October, 1949. Patients were classified as to degree of recovery into three categories: (1) Little electrocardiographic restitution, (2) partial restitution, and (3) complete restitution, depending on certain electrocardiographic criteria.

Seventy-seven of the one hundred patients showed little electrocardiographic restitution, fourteen partial, and nine complete. It is significant that the electrocardiographic pattern following infarction is of no prognostic value in determining survival, but serial studies must be made so that precordial pain will not be misdiagnosed as recent infarction in these aberrant records. Angina pectoris and hypertension occurred, singly or in combination, without statistical significance in the first two groups. None of the nine with complete electrocardiographic restitution showed these conditions.

Heart failure appeared almost entirely in the group of patients with little electrocardiographic restitution.

MORTON TERRY, B.A., D.O.

THE DIAGNOSIS AND TREATMENT OF "MECHANICAL BACKACHE"

"The term 'mechanical backache,'" says George S. Phalen, M.D., in the *Journal of the American Medical Association*, October 15, 1949, "should be reserved for the case in which there is nothing demonstrable that would account for the pain within the back or the pelvis other than mechanical factors." Factors producing back pain are faulty posture, obesity, relaxed abdominal musculature, weak back musculature, and unequal length of the lower extremities (usually more than 4 cm. since the pelvis often compensates for less). "Mechanical backache" has a gradual onset, is localized to the lumbrosacral region (or may be diffused over the lower part of the back into the buttocks). Not severe nor incapacitating, it endures through many years, unaffected by change of weather or by coughing, sneezing, or straining. It appears when the patient has been standing or sitting for long periods of time or when he has become fatigued. Bending, stooping, or lifting may produce the backache.

Physical examination reveals the following: tenderness around the lumbosacral joint or the iliolumbar ligaments, normal range of hip motion, weakness of back and abdominal musculature, no peripheral nerve irritation, equal and active knee and ankle reflexes, a negative "straight leg raising" test, and faulty posture, often obesity, sometimes a short leg. Roentgen examination should show no arthritic changes or structural abnormalities. Diagnosis should differentiate between mechanical backache and chronic fibrositis, acute muscular and ligamentous strain around the lumbar spine, rheumatoid spondylitis, and hypertrophic arthritis, spondylolysis, spondylolisthesis, or lesions of neoplastic or infectious origin.

Treatment consists of prescribing a firm bed, applications of heat for relaxation and the stimulation of circulation, slightly prolonged hot tub baths nightly, gentle massage, and continuous and regular corrective exercises. Improvement is not apparent until these measures have been practiced over a 6- or 8-week period. Braces are usually not advised except for the obese and then only temporarily until the musculature is strengthened. General systemic measures are helpful, such as vitamin supplements, weight-reducing diets, or other measures to improve general health. Pelvic surgery often has had no effect on the backache, or has increased the pain.

Phalen admonishes the physician not to ignore this common complaint, since it can be cured through such conservative measures, if the patient is cooperative.

TRIHEXYPHENIDYL

The present treatment of parkinsonism, spasmodic torticollis, facial spasm, and miscellaneous dyskinesias is not yet ideal. Since the cause of the conditions is unknown, the therapeutic goal is the lengthening of active useful life through symptomatic relief and thereby abbreviating the dependent and moribund stage. Among the newer drugs recommended for use in these conditions is the antispasmodic compound, Artane, or trihexyphenidyl, which Kendall B. Corbin, M.D., evaluates in the *Journal of the American Medical Association*, October 8, 1949.

The drug was given to 104 patients for periods from 6 months to as long as 5 years. Corbin started each patient on 1 mg. 4 times daily, given before meals and at bedtime, gradually increasing the dose by 1 mg. a day to a total amount of 2 mg. 4 times daily, the average dose being 8 mg. a day. However, the ideal dosage had to be determined by experiment. Some patients had good effects on small dosage; some could take up to as much as 18 2-mg. tablets a day without toxic effect before good results were obtained. For a few patients it was not effective. Corbin recommends that trihexyphenidyl not be used for senile patients at all.

Side effects were noticed—dry mouth, nausea, giddiness, blurring of vision, nervousness, tinnitus, tightness in the head, and soreness in the mouth, but there were fewer and less frequently experienced side reactions than usually are produced by the belladonna alkaloids, and the symptomatic relief seemed to have been comparable or even greater. Blood counts and urinalyses remained normal or the changes showed were not attributable to the drug. Its advantage lies in the subjective benefits derived; it is doubtful that there is any effect on the causative mechanism.

Other good emendatory measures for patients with parkinsonism that should not be ignored are psychotherapy (even if it consists of only reassurance, sincere interest, and practical assistance in adjusting activities to limitations) and physiatry—mild massage, heat, and directed exercises.

Book Notices

THE DOCTOR AND THE DIFFICULT CHILD. By William Moodie, M.D., F.R.C.P., D.P.M., Physician in Charge of the Department for Psychological Diseases, University College Hospital, London, England; Medical Director, London Child Guidance Training Centre. Ed. 2. Cloth. Pp. 245. Price $2.00. The Commonwealth Fund, 1947.

Two editions and four printings have made little change in most of the pages of "The Doctor and the Difficult Child." The latest revision contains additional chapters on play therapy and on organization of a child guidance clinic, but few variations on the 1940 edition.

Divided into three sections, this treatise first takes up the general approach to child guidance—history taking, recognition, evaluation, and treatment, discussing each rather thoroughly and without the usual confusing technical theory and language. Particularly good is the portion on therapy which offers many practical points, even at times putting words into the physician's mouth. The second part covers the more specific problems encountered in children, commented on as completely as might be expected in such a short book. New material comprises the third section. Moodie's explanation of the theory behind play technic is excellent and, though handicapped by the expediency of brevity, gives a good account of its salient features. Little more than an outline of the make-up of a child guidance clinic is presented in the chapter on organization.

Moodie has produced an easily-read contribution of value to child guidance literature. One might argue with such statements as "drinks should not be limited [in enuresis]" and "there is a natural tendency in every child to shrink from the subject of sex and things connected with it," but all in all the book is well worth while.

ARNOLD MELNICK, A.B., M.A., D.O.

A CHILD'S EYES. By Richard G. Scobee, B.A., M.D., F.A.C.S., Assistant Professor of Ophthalmology, Washington University School of Medicine, St. Louis, Mo. Cloth. Pp. 109. Price $2.00. The C. V. Mosby Company, 3207 Washington Blvd., St. Louis, 1949.

This monograph is purely for the lay reader. It is mistitled, as it is a discourse on every ramification of crossed eyes and should be so labeled. But in spite of this, Scobee has managed to present a clear, concise, comprehensible compendium on his subject. Every lay person should be able to read with enjoyment and understand to the fullest this well-written and well-illustrated (19 excellent line drawings) booklet.

Exception may be taken by the critical professional reader to several points. Dogmatic adherence to the "long and short eyeball" theory of hyperopia and myopia would draw fire from some ophthalmologists, as Duane and Hunt, and from vision-psychologist Betts. Opponents of the mechanical approach with its hopeless prognosis would also object to the insistence on refraction with cycloplegics. Pediatricians could not go along with the statement, "Eyes which are crossed at birth are not going to straighten with the passage of time," which labels as strabismus the normal lack of binocular coordination found in all newborn infants.

However, for the lay person who wants some insight into the workings of the human eye and who cares little about clashes of scientific dogma, the book is highly recommended. It may well do a job the physician has neither the time nor the ability to do.

ARNOLD MELNICK, A.B., M.A., D.O.

CLINICAL PEDIATRICS. By I. Newton Kugelmass, M.D., Ph.D., Sc.D. Attending Pediatrician, Downtown Hospital, Pan-American Clinic, Heckscher Institute, New York; Consultant Pediatrician, Lynn Memorial Hospital, Monmouth Memorial Hospital and Muhlenberg Hospital, New Jersey; Former Research Pediatrician, Fifth Avenue Hospital, New York City Children's Hospital and Pediatric Research Associate, Yale University. Ed. 2. Cloth. Pp. 409. Price $4.00. Oxford University Press, 114 Fifth Avenue, New York 11, 1947.

A quick reference in pediatrics for the busy general practitioner. Dr. Kugelmass aptly summarizes the text in his "Preface" wherein he says, "All phases of disease are summarized tersely and proven therapeutic measures indicated briefly." All diseases and subject matter are presented in outline form. Each disease has several main headings such as A, Nature; B, Etiology, C, Symptoms; D, Prognosis; E, Treatment. Under each of these main headings the pertinent facts are tabulated 1, 2, 3, 4, etc. All unnecessary words, phrases, and percentage figures are omitted; even under "Treatment" dosages are omitted. In 2 to 3 minutes the busy practitioner can have all the pertinent facts of whatever disease he is interested in. This book well deserves a place on the desk of any physician engaged in a general practice.

LEO C. WAGNER, D.O., M.Sc.

IRON METABOLISM AND ITS CLINICAL SIGNIFICANCE. By A. Vannotti, M.D., Director of the Medical Polyclinic and Professor of Internal Medicine in the University of Lausanne, and A. Delachaux, M.D., Lector of the Medical Polyclinic of the University of Lausanne. Cloth. Pp. 267. with illustrations. Price $6.50. Grune & Stratton, Inc., 381 Fourth Avenue, New York, 1949.

Here is a study developing from research on porphyrins which led to the realization of the intimate chemical relationships described. The authors suggest many other problems to be solved, along with this lucid practical exposition of the results of their own work. It would indeed be a happy situation if all translations preserved clarity and the original quality of language as does this work. Although the field would seem to be relatively narrow, the book is to be recommended as important background reading.

The first part of the book is devoted to the biological significance and the normal metabolism of iron, its absorption from the intestine, its distribution, conversion and storage in the organs, excretion, the effect of age and sex, its role as a growth factor, biocatalyst, and component in blood formation, circulating iron, and the physiology of nonhemoglobin iron.

The second part considers iron metabolism under pathological conditions in hemolysis, disturbances of erythropoiesis, the reticuloendothelial system, lead poisoning, hyperfunction of the bone marrow, hepatic diseases, and general metabolic disturbances.

A third part contains clinical indications and practical considerations for therapy, indicating the most important iron preparations, their use in hemorrhagic anemias, in alimentary iron deficiency anemia and anemia with gastrointestinal disturbances, idiopathic hypochromic anemia and chlorosis, pernicious anemia, tissue disturbances, infectious diseases, and convalescing conditions, contraindications, and doses and duration of iron therapy.

ADVANCES IN INTERNAL MEDICINE. By William Dock, M.D., Long Island College of Medicine, Brooklyn, N. Y., and I. Snapper, M.D., The Mount Sinai Hospital, New York, N. Y., Editors. Volume III. Cloth. Pp. 478, with illustrations. Price $8.50. Interscience Publishers, Inc., 215 Fourth Avenue, New York 3, 1949.

This volume contains articles by a distinguished group of contributors on the following subjects: Use of British anti-lewisite (BAL); Current concepts of hemolytic anemias; Factors modifying penicillin activity; Streptomycin and tuberculosis; Hystoplasmosis; Treatment of hyperthyroidism; Diagnosis by enzymic methods; Plasma fractionation; Acclimatization to heat; and Therapeutic agents in neurologic conditions.

All of the contributions are comprehensive and up to date, and should be of value to physicians who are interested in these topics. The article on Plasma Fractionation by Charles A. Janeway, M.D., Professor of Pediatrics, Harvard Medical School, should be cited for outstanding excellence as well as quality and style of writing.

MEDICINE OF THE YEAR, 1949. Under the editorial direction of John B. Youmans, M.D., Dean, College of Medicine, University of Illinois. Cloth. Pp. 144. Price $5.00. J. B. Lippincott Company, 227 S. Sixth St., Philadelphia, 1949.

It is important for the general practitioner, the specialist, the teacher, or the investigator to be conversant with new discoveries, new theories, and new practices in order to utilize those of real value as early as possible for his patients. Knowledge of the new of necessity needs a tempering evaluation on the basis of the physician's background.

"Medicine of the Year" narrates the developments in internal medicine, allergy, cardiovascular diseases, neurology, pulmonary diseases, dermatology, metabolism and endocrinology, psychiatry, surgery, urology, otolaryngology, ophthalmology, fractures and orthopedics, neurosurgery, anesthesia, obstetrics, and pediatrics. Each contributor assembles and presents significant developments in his field, with references cited.

The editorial intent of presenting newsworthy developments is well conceived. The book is honestly readable. Brevity and simplicity are maintained. Many a busy physician has been looking for just such a serviceable time-saving survey. It may be predicted safely that he will approve future compilations of "Medicine of the Year."

THE PRACTICE OF REFRACTION. By Sir Stewart Duke-Elder, K.C.V.O., M.A., D.Sc. (St. And.),, Ph.D. (Lond.), M.D., F.R.C.S., Hon. D.Sc. (Northwestern); Surgeon-Oculist to H. M. The King; Knight of Grace of the Order of St. John; Consulting Ophthalmic Surgeon to the Army and the Royal Air Force; Director of Research, Institute of Ophthalmology, University of London; Consulting Ophthalmic Surgeon, Moorfields Westminster and Central Eye Hospital; Ophthalmic Surgeon, St. George's Hospital. Ed. 5. Cloth. Pp. 318, with illustrations. Price $6.25. The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, 1949.

This edition of Duke-Elder's popular textbook on refraction is a comparatively short volume that presents the subject of the correction of defects of the optical system of the eyes and the associated muscles in a practical manner. While theoretical matters are dealt with sufficiently to make their application to practical problems understandable, no attempt has been made to enter into the mathematical foundations of the subject. For this reason, it is an excellent book for the student of ophthalmology, but at the same time it contains so much clinical experience that the trained ophthalmologist can profit materially, especially since the style is both compact and smooth-flowing.

In this edition, new knowledge of transient changes in refraction has been added and aniseikonia is treated more fully. The description of the mechanism of accommodation has been brought up to date and a chapter has been added on anomalies of convergence, while experience has allowed a more critical view to be taken of the value of orthoptic treatment of muscular imbalance. Among methods of examination descriptions of streak retinoscopy and velonoskiascopy have been added and the section on refractometry amplified. To make the chapter on spectacles more useful and complete, sections on the theory of best-form lenses, the effectivity and equivalence of lenses, and contact lenses have been amplified.

"As a general rule," the author states in a paragraph meaningful to physicians in general, "the most distress is caused by errors so slight that they readily escape detection unless they are looked for specially. When a gross anomaly exists . . . the diagnosis is apparent and the treatment obvious. But when the error is small the patient is able to rectify it to a greater or less extent by muscular effort . . . and the

constant strain thus involuntarily imposed upon him brings on muscular and nervous fatigue with its attendant train of reflex symptoms. It is not the error itself which causes the trouble so much as the continuous effort called forth automatically in the attempt to correct it. The physician may suspect that a symptom-complex is attributable to the eyes, and on his suggestion the patient will protest that his vision is excellent; but careful examination will show that an unsuspected small error of refraction, or a slight degree of muscular imbalance is present, and its correction will frequently result in an equally unexpected and dramatic relief."

BLOOD AND PLASMA TRANSFUSIONS. By Max M. Strumia, M.D., Sc.D. (Med.), Associate Professor of Pathology, Graduate School of Medicine, University of Pennsylvania; Director, Laboratory of Clinical Pathology, and of the John S. Sharpe Research Foundation, Bryn Mawr Hospital; Member, Subcommittee on Blood Substitutes of the National Research Council, 1940-45, and John J. McGraw, Jr., M.D., Instructor in Pathology, Graduate School of Medicine, University of Pennsylvania; Assistant Attending Pathologist, Bryn Mawr Hospital; Formerly, Commanding Officer of the Blood Bank for the Mediterranean Theater of Operations, Chief of the Blood Research Division of the Army Medical School, and Special Representative to the Surgeon General on Blood and Plasma Transfusion. Cloth. Pp. 498, with illustrations. Price $7.50. F. A. Davis Company, 1914-16 Cherry Street, Philadelphia, 1949.

Any physician who seeks a straightforward, practical approach to transfusion problems will find this volume eminently satisfying, whether he is interested in therapeutic applications or is in need of detail concerning the operation of the blood bank and the preparations for transfusions. The clinician will find the presentation of functions of blood, practical aspects of the Rh factor, indications for transfusion, and adverse reactions and transmission of disease particularly pertinent. Clinical pathologists and laboratory workers are directed to chapters on blood groups and blood types, apparatus for collection and administration of blood, storage of blood, preparation and administration of plasma, storage of plasma, preparation of crystalloid solutions, and a very useful assemblage of generally appropriate technical detail in an appendix arranged for ready reference. Chapters devoted to the organization and operation of a blood and plasma service and the universal use of group-O blood are worth the attention of both clinician and laboratory worker.

Since it has been estimated, conservatively, that the average general hospital needs at least five blood donors per bed per year, doctors in general practice should find this well-organized book interesting.

CLINICAL BIOCHEMISTRY. By Abraham Cantarow, M.D., Professor of Biochemistry, Jefferson Medical College; Formerly Associate Professor of Medicine, Jefferson Medical College and Assistant Physician, The Jefferson Hospital, Philadelphia, and Max Trumper, Ph.D., Commander, H(S), USNR. Lecturer in Clinical Biochemistry and Basic Science Coordinator, Naval Medical School, National Naval Medical Center, Bethesda, Maryland. Ed. 4. Cloth. Pp. 642, with illustrations. Price $8.00. W. B. Saunders Company, West Washington Square, Philadelphia, 1949.

This is the fourth edition of an interesting presentation of the correlation of physiology, biochemistry, and clinical medicine. The authors make no attempt, in general, to present the technic of laboratory methods, nor do they discuss abstract and theoretical considerations. They undertake to show how the internal environment of the body is altered by certain specific changes in tissue and organ physiology and to indicate the manner in which the physician may best avail himself of information which can be obtained by biochemical studies. Therefore, the subject of functional diagnosis by chemical methods has been presented in considerable detail.

Modern practice demands the application of present knowledge regarding aberrations of endocrine, renal, and hepatic function, abnormalities of organic and inorganic metabolism, nutritional defects, edema, dehydration, etc., in all branches of medicine as well as in preoperative and postoperative treatment. The essential function of the laboratory is to supply the clinician with information which will complement that which he may obtain by other methods. However, in order to take full advantage of the findings of the biochemist, the clinician should have a clear understanding of the significance and limitations of laboratory investigation, based upon an appreciation of the biochemical and physiologic factors involved in the preservation and alteration of organ and tissue function.

In the present edition various sections have been extensively revised to keep abreast of the rapid advances made in recent years, and new material has been added on the following topics: chemical changes in shock; thymol turbidity and flocculation; fatty liver; the crush syndrome (lower nephron nephrosis); potassium in treatment of diabetic coma; alarm reaction; goitrogenic agents; and new methods of studying adrenocortical function.

ACUTE LARYNGOTRACHEOBRONCHITIS. By A. Harry Neffson, M.D. Cloth. Pp. 198, with illustrations. Price $5.00. Grune & Stratton, Inc., 381 Fourth Avenue, New York 16, 1949.

The condition traditionally called "croup" is not a clinical entity but a symptom complex, its individual characteristics depending upon the causative organism and the location and nature of involvement of the respiratory tract. Since each of these elements may be different, the condition should be designated specifically. "Acute obstructive laryngotracheobronchitis" describes the extent of involvement and should be applied and limited to the most severe and dangerous cases. Both diphtheritic and nondiphtheritic infectious obstructions of the larynx, trachea, and bronchi are occurring with increasing frequency in recent years. Since 78 per cent of Neffson's series of 400 cases were under 5 years of age, it is apparent that the pediatrician and the family physician, rather than the laryngologist, are forced at times to assume the responsibility of managing these cases, which is the general tendency, anyway, now that sulfonamides and antibiotics are stock in trade. The need for just such a book as this is acute, for croup may fulminate and death occur almost without warning. To have at hand such a succinct explanation of technical details may determine a successful outcome rather than tragedy.

The book is practical, detailed, comprehensive. The chapter on supraglottic laryngeal edema is worth attention. There is an excellent chapter concerning specific and supportive medical treatment, laryngoscopy, aspiration, intubation and extubation, intubation and/or tracheotomy, tracheotomy and its indications with clear-cut directions on preoperative care, operative procedure, postoperative care, suggestions and warnings, medical and mechanical treatment, complications to anticipate, and directions for decannulation.

Illustrations include tissue sections of the larynx and trachea with streptococcal, measles, and varicella infections and a series of well-selected roentgenograms.

CLINICAL NEUROLOGY. By Bernard J. Alpers, M.D., Sc.D. (MED.), Professor of Neurology, Jefferson Medical College, Philadelphia; Neurologist to the Jefferson, Pennsylvania, and Wills Hospitals, Philadelphia. Ed. 2. Cloth. Pp. 846, with illustrations. Price $9.50. F. A. Davis Company, 1914-16 Cherry Street, Philadelphia, 1949.

The second edition of this excellent volume has been revised, particularly in regard to cranial trauma and peripheral nerve injuries. Changes in treatment for meningitis, neurosyphilis, poliomyelitis, and epilepsy have been incorporated.

Osteopathic physicians will find much of value in the comprehensive description of neurological procedure, which extends to segmental innervation of the muscles of the body, nor should he pass over the chapter evaluating and interpreting signs and symptoms, since it is superior to the discussion offered in most texts. Alpers believes localizing the diseased areas should follow the examination and has presented a fine chapter on topical diagnosis.

The text covers thoroughly the history, causes, and treatment of headache, vertigo, coma, pain, neuritis, and the neuralgias; diseases of the spinal cord; diseases of the

meninges; encephalitis; syphilis of the brain; vascular diseases of the brain; tumors of the brain; abscess of the brain; cranial trauma; epilepsy and convulsive states; extrapyramidal diseases; multiple sclerosis; intoxications and injuries by physical agents; vegetative nervous system and endocrine disorders; nuclear amyotrophies and myopathies; degenerative diseases; congenital and developmental disorders, and diseases of the skull and vertebrae.

The serviceability of a well-organized book is herein demonstrated. In the second edition the lists of tables and illustrations have been eliminated, as such, and may be located through the general index. The bold-faced boxed outline of each chapter has been used again. The tables are revised and illustrations substituted or added.

OPERATIONS OF GENERAL SURGERY. By Thomas G. Orr, M.D., Professor of Surgery, University of Kansas School of Medicine, Kansas City, Kansas. Ed. 2. Cloth. Pp. 890, with illustrations. Price $13.50. W. B. Saunders Company, West Washington Square, Philadelphia, 1949.

This volume is designed not only for the beginner in surgery, but for the general surgeon as well. Since general surgeons are frequently called upon to perform operations which are usually done by surgeons in the special field of surgery, many operations are described and illustrated which ordinarily appear only in books of the surgical specialties. The step-by-step illustrations are a striking feature of this excellent work which consistently stresses the anatomy, indications, dangers, and safeguards to be kept in mind in the many kinds of operations which the book so clearly describes.

In this edition Callander's technic has been added in the chapter on Amputations. Modern technics for lobectomy have been described in the chapter on Thorax and Respiratory System. The chapter on the Circulatory System contains new technics for blood vessel anastomosis and for treatment of embolism, thrombophlebitis, and phlebothrombosis. The technic of wound closure with steel wire, and a more complete discussion of transverse abdominal incisions, have been included in the chapter on Abdominal Incisions. The technic of the repair of hernias using Cooper's ligament, and additional technics for the repair of difficult hernias are described and illustrated. Many other revisions and new technics are discussed in this edition.

MODERN DISCOVERIES IN MEDICAL PSYCHOLOGY. By Clifford Allen, M.D., M.R.C.P., D.P.M., Physician in charge of the Psychiatric Department of the Seamen's Hospital, Greenwich. Psychiatrist to the Ministry of Pensions, London. Ed. 2. Cloth. Pp. 236. Price $3.50. The Macmillan Company, 60 Fifth Avenue, New York, 1949.

This is an outstanding book which tells the story of the discovery of the unconscious mind. Beginning with Mesmer and the strange discoveries and ideas of the hypnotists, it passes on to Janet's studies of loss of memory and theories of "dissociation" and "psychic tension." Morton Prince's work on dual personality and his theory of the co-conscious are discussed. Freud's invention of psychoanalysis, his theory of the sexual nature of the "libido," of dream analysis, and the meaning of blunders, of wit, of symptoms, and other discoveries of the psychoanalysts are dealt with at length. It discusses the secession of Jung and Adler and the nature of their beliefs. Kretschmer's theories of the relation between physique and temperament follow, and Pavlov's discoveries are described in detail. The book closes with a description of Wagner-Jauregg's treatment of syphilis of the brain by malaria, insulin treatment of schizophrenia, and electrical shocks in depression.

The author states that "An attempt has been made here to give an impartial description of modern psychological views without any of the fulsome nonsense which invades so many books—particularly on psychology—when they are not written exclusively for the specialist." Not only has he accomplished this purpose, but his ability to convey the essence of various theories in a simple, graphic, and meaningful manner has resulted in a very readable and stimulating book.

PHARMACEUTICAL COMPOUNDING AND DISPENSING. Editor-in-Chief Rufus A. Lyman, M.D., Dean, College of Pharmacy, University of Arizona. Cloth. Pp. 322, with illustrations. Price $6.50. J. B. Lippincott Company, 227 South Sixth Street, Philadelphia, 1949.

The value of a broad systematization of physiochemical concepts in relation to pharmacy as a profession cannot be questioned. Within its own field this book will surely be widely used.

As the best professional capacities of the pharmacist are of inestimable use to the physician, certain portions of this book should be read by the physician, especially the intern and the young doctor beginning to practice. For example, information in Plein's chapter, "The Prescription," if assimilated and put into practice by both pharmacists and doctors, would promote improved relations between the two professions and better service to the public. Prescription procedure, pharmaceutical Latin, prescription refilling, legal aspects of pharmacy—all directly concern the doctor.

The question of interprofessional relations is thoroughly explored in a chapter by Foote, who recommends several sound measures for giving service and for avoiding practices offensive to the doctor.

Understanding the principles of prescription pricing, which are explained by Briggs, will assist the physician to evaluate professional standards among pharmacists and to co-operate in the best interests of the patient.

Even though this volume is not addressed to the physician, anyone who prescribes drugs will do well to examine the book.

ATLAS OF ROENTGENOGRAPHIC POSITIONS. By Vinita Merrill. Volumes I and II. Cloth. Pp. 372, with illustrations. Price $30.00. C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, 1949.

With the scarcity of qualified courses in the young and rapidly growing profession of roentgenography, the present-day technician has usually learned his work in the school of experience and is often at a loss, because information is widely scattered throughout the literature, to know where to find subject matter for further study. This remarkable compilation is designed as a practical reference book for x-ray technicians and meets the need for a complete assembly of available material.

Specialized as well as standard positions are described, information pertaining to anatomy and physiology is presented, definitions for the more usual terms in roentgenography are given, and a bibliography is provided to facilitate further detailed study. Each procedure is illustrated and described briefly and clearly to include only those facts and principles which the x-ray technician needs to know, and know well, in order to work with understanding and intelligence.

For each position the projection is indicated, as well as the film, position of patient, position of part, and structures shown; and each is illustrated with photographs of the positions and reproductions of the resulting roentgenograms, together with inset drawings in many cases to explain the procedures more clearly. The work has been given an excellent presentation in two attractive volumes with large pages and splendid illustration in a format convenient for quick reference.

UROLOGICAL ASPECTS OF SPINAL CORD INJURIES. By George C. Prather, M.D., Department of Genito-Urinary Surgery, Harvard Medical School, Boston, Massachusetts. Cloth. Pp. 146, with illustrations. Price $3.75. Charles C Thomas, Publisher, 301-327 East Lawrence Ave., Springfield, Ill., 1949.

Since urological complications long were the principal cause of death in patients who survived the initial shock of spinal cord injuries, the best efforts of neurosurgeons, urologists, and physicians who must care for such injuries are directed to restoring the urogenital tract to its physiological function or the best possible approximation. For this reason the monograph reiterates encouragement to the medical and nursing staff, urging "sincere interest in the welfare of the patient, a strict attention to aseptic conditions, and an understanding of the aims of treatment."

Prather summarizes the knowledge available in anatomical and neurophysiological studies of the normal urogenital tract, the observations in experimental animals after section of various nerves and of the spinal cord, and clinical failures and successes, which have been vastly increased by the numbers of military casualties from World War II.

The author pays attention particularly to the examination of the bladder and bladder neck and recommendations for care of the bladder, with a careful analytical comparison of methods. Also discussed are changes in the upper urinary tract and sexual organs after spinal cord injury, genitourinary complications, the results of treatment, and a comparison of policies dictated during the two world wars.

The subject matter seems well handled and well documented in general, but there are discrepancies in the indexing and a few bibliographic inconsistencies which detract from the general impression of real worthiness.

ELECTROTHERAPY AND LIGHT THERAPY. By Richard Kovacs, M.D., Professor of Physical Medicine, New York Polyclinic Medical School and Hospital; Attending Physical Therapist, Manhattan State, Harlem Valley State and Columbus Hospitals; Visiting Physical Therapist, New York City Department of Correction Hospitals; Consulting Physical Therapist, Mary Immaculate Hospital, Jamaica, N. Y., St. Charles Hospital, Port Jefferson, L. I., Alexian Brothers Hospital, Elizabeth, N. J.; Area Consultant, Physical Medicine Rehabilitation, Veterans Administration; Consultant in Physical Medicine, Office of the Surgeon General, Army Department. Ed. 6, thoroughly revised. Cloth. Pp. 740, with illustrations. Price $10.00. Lea & Febiger, Washington Square, Philadelphia, 1949.

Emphasizing the attitude that the practice of physical medicine is a blend of the science and the art of healing, utilizing the vast resources of Nature to accelerate repair of injured or diseased tissue, to revitalize altered function, to ameliorate pain and to improve body tone, this sixth edition of a well-known text aims to instruct the general practitioner and the specialist in various branches of medicine. Better understanding and more extensive employment of rehabilitation requires knowledge of the principles of electrotherapy and light therapy. The instruction in this book is direct, intensive, and comprehensive.

Current information is added to the new edition on electrophysics and electro-diagnosis, on low frequency currents, including electric muscle stimulation and the new method of microwave diathermy. Specific progress in treating traumatic conditions, central and peripheral nervous conditions, and arthritis is reported. All the part on applied physical medicine has been affected by the changes of the last few years not only because of wartime experience but because of the comparable civilian contribution to the figures of the injured. As Dr. Knudson, who contributed a fine chapter on "Physical Medicine and Rehabilitation in General Practice," points out, "Most of us are familiar with the figures of approximately 17,000 amputations done in the Army during the first four years of World War II, but during the same period there were 120,000 major amputations from disease and accident in the civilian population."

In general practice the technics described herein are applicable to many situations. Perusal of this book should prove most rewarding to the osteopathic physician, who, if it is not already on his shelf, may find he wants it in easy reach.

DISEASES OF THE AORTA. By Nathaniel E. Reich, M.D., F.A.C.P., Associate in Medicine, Long Island College of Medicine; Attending Cardiologist, Harbor Hospital, Brooklyn, N. Y.; Associate Attending Physician, Kings County Hospital, Brooklyn, N. Y.; Senior Cardiologist, Veterans' Administration, Brooklyn, N. Y. Cloth. Pp. 288, with illustrations. Price $7.50. The Macmillan Company, 60 Fifth Avenue, New York, 1949.

The surgical and medical means now at hand for the treatment of conditions of the aorta which less than a generation ago could only be dismissed as congenital abnormalities or bulging aneurysms after academic interest had exhausted observation are presented in this comprehensive and stimulating monograph.

Dr. Reich states that the general practitioner's "diagnostic acumen must be sharpened so that a large group of relatively neglected diseases can be subjected to appropriate lifesaving procedures." The volume has significance not only to the surgeon and cardiologist but to the clinician who first sees the patient. Two chapters on diagnosis with directions for the use of procedures with and without x-ray equipment are worth attention. The clinician carries the responsibility of knowing there is hope for patients with these hitherto untreated conditions.

In surgery there are sympathectomies, arteriotomy for aortic occlusions, aortic resection for coarctation, filipuncture and aneurysmectomy for luetic aneurysm, arterioplasty and arterial anastomoses, and other technics too numerous to list in review.

In medicine intravascular occlusions can be treated with heparin and Dicumarol; syphilis of the aorta, bacterial endocarditis, and other infections with antibiotics; the circulatory deficiencies resulting from aortic occlusion with physical measures such as passive vascular exercises and the oscillating bed.

A DESCRIPTIVE ATLAS OF RADIOGRAPHS. An Aid to Modern Clinical Methods. By A. P. Bertwistle, M.B., Ch.B., F.R.C.S. Ed. Ed. 7, revised and enlarged. Cloth. Pp. 622, with illustrations. Price $16.00. The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, 1949.

This book, written by a clinician for clinicians, attempts to portray many of the normal and abnormal conditions that are met with in practice, with the object of showing the immense possibilities of X-rays for confirming or giving precision to diagnoses. Although the work should be of value to radiologists, it is primarily intended for the use of the clinician who, without being concerned with the technical side, yet desires to know what X-rays are capable of revealing to him. The book is well organized and presented, and the reproductions are excellent.

As far as possible the earliest manifestations of disease are depicted; time will show that many clinical signs and symptoms are in fact complications, the condition having been diagnosable much earlier by X-rays. It is interesting to note, as the author says in the Introduction, that "A certain number of plates, particularly of the bones, appeared in the first edition," which was printed in 1926. "Owing to the rapid progress of medicine during the last twenty years many diseases, once common, are never seen in their advanced state nowadays. In fact, certain conditions depicted will be of value as museum curiosities in a few years' time."

THE KINESIOLOGY OF CORRECTIVE EXERCISE. By Gertrude Hawley, M.A., Formerly Head of Corrective Gymnastics at Stanford and Northwestern Universities. Ed. 2, thoroughly revised. Cloth. Pp. 192, with illustrations. Price $3.75. Lea & Febiger, Washington Square, Philadelphia, 1949.

"The purpose of this book," the author states, "is to provide a practical text in kinesiology for the use of students, teachers, and physiotherapists specializing in the field of corrective exercise." Judged on this basis, the volume appears to fulfil its purpose admirably, for it provides the essential knowledge of human anatomy and physiology, offers the special training needed to recognize faulty growth and definite malfunctioning, and shows how to ameliorate such conditions.

Part I covers fundamental anatomical and pathological considerations and includes a discussion of the orthopedic conditions most commonly encountered in this field. Part II gives definite posture standards, followed by corrective exercises for each of the conditions that require remedial measures, based on the author's experience in college teaching and in the practice of physiotherapy. This book can safely be recommended by physicians who may be called upon to advise on selection of a text in this field.

Conventions and Meetings

Announcements

American Osteopathic Association, Fifty-Fourth Annual Meeting, Chicago, July 10-14, inclusive. Program Chairman, C. R. Nelson, Ottawa, Ill.

Academy of Applied Osteopathy, Eastern Postgraduate Course, Hotel Statler, New York City, April 3-6.

American College of Osteopathic Internists, Eastern Study Group, Philadelphia, March 30-April 2; annual meeting, Continental Hotel, Kansas City, Mo., October 23-26. Program Chairman, Stuart Harkness, Des Moines, Iowa

American College of Osteopathic Obstetricians and Gynecologists, Ambassador Hotel, Los Angeles, February 20-22. Program Chairman, Bernard Abel, Toledo, Ohio.

American College of Osteopathic Pediatricians, Region 1, New York, March 31.

American College of Osteopathic Surgeons, Hotel Savery, Des Moines, Iowa, October 15-19. Program chairman, Howard A. Graney, Des Moines, Iowa.

American Osteopathic Academy of Orthopedics, Hotel Savery, Des Moines, Iowa, October 15-19. Program Chairman, Harry F. Shaffer, Detroit.

American Osteopathic College of Radiology, Hotel Savery, Des Moines, Iowa, October 15-19; Board of Governors, October 11. Program Chairman, D. W. Hendrickson, Wichita, Kans.

American Osteopathic Hospital Association, Hotel Savery, Des Moines, Iowa, October 15-19. Program Chairman, Mr. Edward C. Barron, Detroit.

American Osteopathic Society of Proctology, Shamrock Hotel, Houston, Tex., April 3-5. Program Chairman, Marille E. Sparks, Dallas, Tex.

American Society of Osteopathic Anesthesiologists, Hotel Savery, Des Moines, Iowa, October 15-19. Program Chairman, Crawford M. Esterline, Kirksville, Mo.

Arizona, Westward Ho, Phoenix, May 12-14.

Arkansas, Albert Pike Hotel, Little Rock, May. Program Chairman, L. J. Bell, Helena.

California, Sacramento, annual convention, May 3-5, Board, April 30, House of Delegates, May 1, 2.

Georgia, Hotel Thomas, Thomasville, May 12, 13.

Hawaii, April 27-29. Program Chairman, Josephine E. Morelock, Honolulu.

Illinois, Knickerbocker Hotel, Chicago, May 12-14.

Indiana, Fowler Hotel, Lafayette, May 14-16. Program Co-Chairmen, H. D. Wolf and John Kenney, both of Indianapolis.

Iowa, Hotel Fort Des Moines, Des Moines, May 15, 16; joint meeting of House of Delegates and Board of Trustees, May 14. Program Chairman, H. D. Meyer, Algona.

Kansas, House of Delegates, Gleason Hospital, Larned, April 29, 30; annual convention, Allis Hotel, Wichita, October 1-4. Program chairman, Irwin J. Conant, Meriden.

Kentucky, Brown Hotel, Louisville, October 11, 12. Program Chairman, Martha Garnett, Louisville.

Maine, postgraduate seminar, Waterville, March; annual meeting, Samoset Hotel, Rockland, June.

Michigan, refresher course, April 14, 15; House of Delegates, April 16; annual meeting, Civic Auditorium, Grand Rapids, October 1-5. Program Chairman, Ralph F. Kraker, Ann Arbor.

Missouri, St. Louis, October 12-14. Program Chairman, Theodore Corcanges, Raytown.

New Jersey, Hotel Stacy Trent, Trenton, March 3-5.

New Mexico, El Rancho Hotel, Gallup, September 14-16. Program Chairman, William D. Andrews, Albuquerque.

New York, Hotel Statler, New York City, October 13, 14. Program Chairman, Charles K. Smith, Elmira.

North Dakota, Rudolph Hotel, Valley City, May. Program Chairman, Harry Homewood, Valley City.

Northwest Osteopathic Conference (Washington and Oregon Osteopathic Associations), Winthrop Hotel, Tacoma, June 4-7. Program Chairman, E. D. Mosier, Puyallup, Wash.

Ohio, Deshler-Wallick Hotel, Columbus, May. Program Chairman, W. D. Henceroth, Grove City.

Oklahoma, Biltmore Hotel, Oklahoma City, November 7-9. Program Chairman, Daniel B. Heffelfinger, Oklahoma City.

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Ontario, Barrie, May 5, 6. Program Chairman, J. E. Wilson, Barrie.
Oregon: See Northwest Osteopathic Convention.
Osteopathic College of Ophthalmology and Otorhinolaryngology, Los Angeles, fall.
Osteopathic Cranial Association, July 15, 16.
South Carolina, Wade Hampton Hotel, Columbia, May.
South Dakota, State Game Lodge, Black Hills, June. Program Chairman, M. C. Thompson, Watertown.
Texas, Hotel Texas, Fort Worth, April 27-29. Program Chairman, Earle H. Mann, Amarillo.
Vermont, Rutland, October 4, 5. Program Chairman, M. C. Smith, Bennington.
Washington: See Northwest Osteopathic Convention.
West Virginia, Chancellor Hotel, Parkersburg, May 7-9. Program Chairman, Harry Myer, Vienna.
Western States Osteopathic Society of Proctology, Biltmore Hotel, Los Angeles, September 25-27. Program Chairman, Lee R. Borg, Los Angeles.
Wisconsin, Schroeder Hotel, Milwaukee, May 4, 5.

OFFICIAL AND AFFILIATED ORGANIZATIONS

ARIZONA

Tucson

Vernon W. Pierce addressed the December 7 meeting, his subject being "Diabetic Coma." A meeting was scheduled for January 4.

CALIFORNIA

State Society

In conjunction with the Associated Alumni of the Los Angeles College of Osteopathic Physicians and Surgeons, the state society presented the following speakers at a week-end lecture meeting December 3 and 4 in Oakland: Julian Lansing Mines, III, Long Beach; Clayton H. Morgan, Kansas City, Mo.; J. P. Oswald, Oakland; Robert Packard Morhardt, South Pasadena; W. Donald Baker, Donald M. Donisthorpe, and Paul B. McCracken, the latter three of Los Angeles.

Hospital Association

Recently appointed executive secretary is Mr. J. Harold Bailey, Los Angeles.

Alameda County

A meeting has been scheduled for March 9.

Citrus Belt

J. Gordon Hatfield, Los Angeles, was scheduled to speak at the December 8 meeting in Upland on "Diagnosis and Treatment of the Acute Abdominal Conditions."

Long Beach

Discussing his observations of European medical clinics, Vincent P. Carroll, Laguna Beach, addressed the December meeting.

Los Angeles City

"Juvenile Problems in the City of Los Angeles" was the subject of the address by Mr. Robert W. Bowling, Jr., at the meeting December 13.

Mr. C. Earle Memory was scheduled to discuss "Pertinent Facts about Your Income Tax," at the January 10 meeting.

Southeast

James A. Bird, South Gate, is president-elect, not Herman Siegal, as announced in the December issue. THE JOURNAL regrets the error.

Southside

According to an advance announcement, John B. Wessel, Los Angeles, will speak on "Office Proctology," at the meeting March 2.

FLORIDA

District Six

The officers are: President, D. A. Musselman, Ft. Lauderdale; vice president, C. E. Dove, West Palm Beach, and secretary-treasurer, S. I. Francis (re-elected), Lake Worth. The trustees are J. W. Norton, Ft. Lauderdale, Lloyd Woofenden, and M. L. Garrett, the latter two of Lake Worth.

The committee chairmen are: Membership, C. S. P. Ball, Boca Raton; ethics, Robert W. Gates, Ft. Lauderdale; hospitals, James Wayne Miller, Pompano Beach; clinics, Dr. Garrett; convention program, Roy T. Quick, West Palm Beach; legislation, Charles W. Vogler, Delray Beach; public health, A. J. Little, Lake Worth, and public relations, George Russell Norton, Ft. Lauderdale.

IDAHO

Boise Valley

Arthur S. Cudmore, Boise, addressed the December 15 meeting in Caldwell. His talk and demonstration concerned cranial osteopathy.

A meeting was scheduled for January 19.

ILLINOIS
First District

A meeting was scheduled for January 12 in Chicago, at which Mr. William Murray was to demonstrate clinical hypnosis.

KANSAS
Northeastern

Meetings were scheduled for December 14 and January 10 in Horton.

Southeastern

December 15 in Fredonia genitourinary diagnosis and diseases were the subjects of a lecture and slide demonstration by Richard L. Wright and D. W. Hendrickson, Wichita.

MASSACHUSETTS
State Society

According to an advance announcement, the program for the annual convention in Boston January 21, 22, included the following:

James M. Eaton, Philadelphia, "Management of Scoliosis" and "Herniated Disk Syndrome from the Viewpoint of an Osteopathic Orthopedist"; Edward G. Drew, Waterville, Maine, "Diseases of the Breast" and "Pathological Conditions of the Cervix"; H. Willard Sterrett, Philadelphia, "The Upper Genitourinary Tract" and "The Lower Genitourinary Tract"; I. Paley Rak, M.D., Boston, "The Psychiatric Problems Facing the General Practitioner"; Edward B. Sullivan, Boston, "Basic Principles of Lumbar Technic" and "The Physiology of Exercises in Low-Back Disturbance," and Robert H. Veitch, Boston, "Tinnitus."

Connecticut Valley

Ralph D. Head, Pittsfield, spoke to the December 14 meeting on "Proctological Problems in General Practice," demonstrating the technics used in ambulant proctology.

Mystic Valley

Karnig Tomajan, Boston, at the December 14 meeting, presented the subject, "The Use of Estrogens in General Practice."

MICHIGAN
State Society

The officers were reported in the January JOURNAL.

Department heads and committee chairmen are: Department of Judiciary, Raymond Parker Perdue, Flint; postgraduate assembly, Dr. Perdue. Honorary general chairman, 1950 convention, William A. Ellis, Grand Rapids; general chairman, Walter B. Stribley, Milan; assistant general chairman, Russell M. Wright, Highland Park; program committee, Ralph F. Kraker, Ann Arbor; assistant chairman program committee, Edward S. Kanter, Detroit; service clubs, Truman Rentschler, Tecumseh, and Louis J. Paul, Chelsea; public relations, Willis H. Yeamans, Mt. Clemens and Mr. Harve Lamont Smith, Highland Park; athletic banquet, Dr. Perdue; exhibits and facilities, Frank T. Broadwater, Adrian; entertainment, Kenneth C. French, Monroe; vocational guidance luncheon, Roy J. Harvey, Midland, and Dr. Wright; golf tournament and stag dinner, J. Vincent Murphy, Grand Blanc. Department of Internal Affairs, Campbell A. Ward, Mt. Clemens; veterans' affairs, Dr. Ward; placement bureau, Arthur A. Speir, Merrill; ethics and censorship, Alan R. Becker, Jackson; bureau of hospitals and clinics, Bertram E. Crase, Battle Creek; auxiliary, Mrs. Henry Watchpocket, Detroit; social welfare, H. William Guinand, Riverdale. Department of Statistics, Dr. Ellis; editor-in-chief, Dr. Ellis; publication editor, Mr. Harve Lamont Smith; technical editor, C. Wallace Evarts; photographic editor; Mr. Joe Clark, the latter two of Detroit; advertising editor, Beth Garrett Smith, Highland Park; associate editors—laboratory, Norman W. Arends, Ferndale; radiology, Arthur H. Witthohn, Grand Rapids; eye, ear, nose, and throat, Frank W. Paul, Detroit; internal medicine, Howard Gault, Grand Rapids; public health, Stanley J. Turner, Detroit; surgery, R. J. Krainik, Lansing; anesthesiology, Carl E. Schefold, Detroit, proctology, Leroy C. Johnson, Pontiac; orthopedics, J. Paul Leonard, Detroit; obstetrics and gynecology, James G. Matthews, Jr., Highland Park, and Roy G. Bubeck, Jr., Grand Rapids; hospital association, Mr. Donald McKenna, Carson City; women's auxiliary, Mrs. Kenneth F. Kinney, Detroit. Department of Public Health, O. L. Brooker, Plymouth; disease control, Dr. Brooker; venereal disease control, James D. Stover, Detroit; cancer control, A. P. Ulbrich, Highland Park; tuberculosis control, Donald J. Evans, Detroit; maternal and child health, Dr. Matthews; undulant fever control, J. L. McDougal, Detroit; crippled children, Donald Kelsey, Vermontville; cardiology, Sidney F. Ellias, Detroit; advisors to department of public health, Harry P. Stimson, Highland Park, and Claude B. Root, Greenville. Department of Professional Development, Dr. Harvey; professional educa-

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Hospital Association

The officers are: President, Raymond Parker Perdue, Flint; vice president, D. W. Green, Traverse City, and secretary-treasurer, Mr. John C. Zemke, Mt. Clemens. The trustees are Mr. Phillip Vicari, Grand Rapids, and Bertram E. Crase, Battle Creek.

Past Presidents' Council

The officers are: Chairman, Harold D. Hutt, Holly; vice chairman, Robert K. Homan, Highland Park, and secretary-treasurer, Philip E. Haviland, Detroit.

Capitol

The officers are: President, R. J. Krainik and secretary-treasurer, H. G. Porter. The trustees are Robert G. Gardner, Lowell J. Green, and Harold L. Shade. All are from Lansing.

Kalamazoo Tri-County

The officers are: President, Milton Lucas, Kalamazoo; president-elect, George R. Hoekzema, Colon; vice president, J. Maxwell Jennings, and secretary-treasurer, Curtis H. Bartlett, both of Kalamazoo.

The trustees are Ernest L. Wheat, Allegan; Kenneth E. Marshall, Kalamazoo, and Albert E. Van Vleck, Paw Paw.

MISSOURI

State Society

The officers were reported in the November JOURNAL and the trustees and committee chairmen in the January JOURNAL. In addition, J. Edward Sommers, St. Louis, recently was appointed general arrangements chairman for the 1950 convention. His committee chairmen are: Entertainment, Richard P. Rounce, Overland; facilities, Paul F. McRae; information, E. A. Barnicle, the latter two of St. Louis; speakers bureau, Byron M. Bury, Clayton; publicity and radio, J. Lincoln Hirst, St. Louis; subchairman for radio, Harriet Parker, Ferguson; subchairman for newspaper publicity, Janet G. Meredith; commercial exhibits, T. Douglas Blaylock, and local arrangements for the auxiliary, Mrs. Lloyd T. Olson; the latter three are from St. Louis.

Central Ozark

Mr. A. H. Ringo talked to the December 1 meeting in Rolla about "Income Tax Problems of the General Practitioner." A meeting was scheduled for January 5.

Osage Valley

December 9 in Jefferson City F. V. Hetzler, Kirksville, spoke on "Medical Management of Cardiac Emergencies."

West Central

Mr. Harry Farrar was the speaker at the December 15 meeting in Sedalia.

NEW JERSEY

State Society

According to advance information the March convention program is to include the Francis Finnerty Memorial Lecture, "The Physiological Aspect of Intrathoracic Disease," Charles M. Worrell, Palmyra, Pa.; "Traumatic Surgery," Ralph W. Davis, Audubon, and "Plastic Surgery," Arthur Von Deilen, D. D. S. and M. D., Camden.

NEW YORK

Central New York

Robert Johnson, M. D., addressed the meeting December 8 on antituberculosis measures.

Charles K. Smith, Elmira, was scheduled to speak at the next meeting on the significance of the low back condition.

Mohawk Valley

The officers are: President, William B. Buxton; vice president, A. C. Hughes, both of Utica, and secretary-treasurer, A. D. Wagner, Herkimer.

George Etling, M. D., Rome, spoke at the meeting December 14 about mental hygiene.

OHIO

State Society

At the refresher course offered February 15 and 16 in Toledo addresses were scheduled as follows: "Know Your Anemias," "Be Up to Date on Anemia," and "Modern Treatment of Anemia,"

Clarence E. Baldwin, Philadelphia; "Pathologic Changes of the Heart," "Trophoblastic Thesis of Cancer," "Pathologic Changes of the Lungs," and "Care of the Dying and the Dead," Robert P. Morhardt, South Pasadena, Calif.; "Differential Diagnosis — Treatment," "Diseases of the Breast" and "Metabolic Diseases—Treatment," Ward E. Perrin, Chicago.

First District Academy (Toledo)

Ralph S. Licklider, Columbus, is scheduled to speak at the meeting March 15.

According to an advance announcement Robert S. Haas, Dayton, will address the academy February 15.

In January, John J. Coan, Cleveland, was to discuss "Contagious Diseases."

Third District Academy (Cleveland)

Harold E. Clybourne, Columbus, spoke at the meeting December 5 on "Orthopedics."

OKLAHOMA

Northwestern

The officers were reported in the September JOURNAL.

The committee chairmen are: Program and ethics, LeRoy F. Gau; membership, A. W. Krause; hospitals, Vernon J. Gau; public relations, James B. Nay, all of Enid; clinics, Frank B. Weir, Fairview; statistics, Ivan L. Clark, Kingfisher, and public health, George Soper, Billings.

PENNSYLVANIA

First District

The officers are: Chairman, Robert D. Anderson; vice chairman, Harry E. Binder, Jr.; secretary-treasurer, Hubert A. Wagner, and council representative, Arthur M. Flack, Jr., all of Philadelphia.

Third District

Features of the meeting December 8 in Allentown were a film illustrating the diagnosis and treatment of breast cancer and an address, by Mr. Richard Eshelman, Reading, on "Jurisprudence."

Fifth District

The officers are: Chairman, William J. Davis, West York; vice chairman, Charles H. Brimfield, York; secretary-treasurer, William H. Lodge, Hershey, and council representative, Elwood W. Swift, Lancaster.

TENNESSEE

Middle

At the December 4 meeting in Tullahoma, James R. Shackleford, Nashville, was scheduled to speak on vitamin therapy and Fred L. Mitchell, Chattanooga, on "Chapman's Reflex in Diabetes." Others on the program were S. D. Alexander, Columbia; J. C. Emmons, Chapel Hill; J. Earl O'Bryan, Springfield; Phil Adams, Tracy City, and Nannie B. Riley, Rome, Ga.

TEXAS

District One

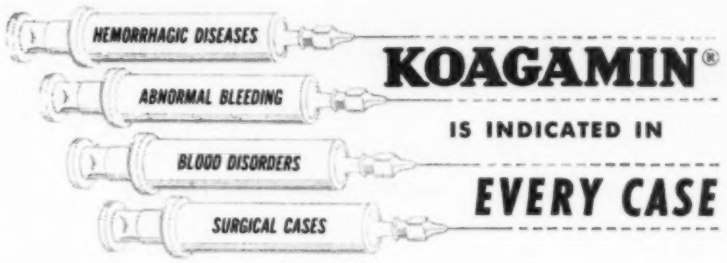
A meeting was scheduled to be held in Clarendon, Sunday, February 5.

District Two

"How to Stop Worrying" was the subject of an address presented at the December 8 meeting.

District Four

The December meeting was scheduled to be in Comanche with Phil R. Russell, Ft. Worth, as guest speaker.



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District Six

C. A. Tedrick, Denver, at the meeting December 4 presented the subject of isotopes and their use. He also showed films on malignancies.

District Nine

A meeting was scheduled in Gonzales December 14. Surgical films were to be shown.

UTAH

State Society Auxiliary

The officers are: President, Mrs. E. F. Waters, Salt Lake City; first vice president, Mrs. W. G. Hale, Logan; second vice president, Mrs. L. W. Shafer; secretary-treasurer, Mrs. E. O. Bauman, both of Salt Lake City.

WEST VIRGINIA

Ohio Valley

A meeting was held in Wheeling December 15.

Southern

Lectures at the quarterly meeting in Hinton December 11 were "Newer Developments in Treatments of Arthritis," R. P. Sharp, Mullens; "Low-Back Pains," W. H. Carr, Bluefield; "Blood Pressures," Paul Cunningham, Oak Hill; "Industrial Medicine," W. V. Dunbar, Meadow Bridge; and "The Common Cold," J. M. Laing, Beckley.

The society is scheduled to meet in Bluefield March 19.

WISCONSIN

Milwaukee District

A meeting was scheduled for January 5.

Fox River Valley

A. V. Mattern, Green Bay, demonstrated cranial technics and R. C. Fischer, Stevens Point, general technic at the December meeting. The January meeting was scheduled for the twelfth.

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CANADA

Canadian Osteopathic Association

The officers and members of the board of directors were reported in the January JOURNAL.

The committee chairmen are: Public relations, J. E. St. Clair Parsons, Ottawa, Ont.; professional affairs, F. H. Deeks, Winnipeg, Man.; professional education, Joan C. McAllister; ethics and censorship, J. J. O'Connor, the latter two of Toronto; membership, Frederick G. Marshall, Montreal; professional opportunity, M. Paul Christianson, Hamilton, Ont.; clinical study, and gifts and endowments, E. S. Detwiler, London, Ont.; program material, R. Brown Irvin, St. Catharines, Ont.; convention and public health, Norman W. Routledge, Chatham, Ont.; exhibits, D. A. Jaquith; facilities, Douglas E. Firth, both of Toronto; publicity, R. H. Wettlaufer, Hamilton, Ont.; program, Dr. Routledge; public affairs, M. P. Thorpe, Vancouver, B. C.; provincial affairs, Homer B. Curry, Sault Ste. Marie, Ont.; health insurance, J. E. Wilson, Barrie, Ont.; vocational guidance, W. P. Currie, Montreal; rehabilitation, George R. Church, Orillia, Ont.; campaign committee, Canadian Osteopathic Educational Trust Fund, R. A. Linnen, Ottawa, Ont.

SPECIAL AND SPECIALTY GROUPS

AMERICAN COLLEGE OF OSTEOPATHIC SURGEONS

The officers were reported in the December JOURNAL.

Members of the board of governors are: William E. Waldo, Seattle; Sam F. Sparks, Dallas, Tex.; Walter F. Rossman, Grove City, Pa.; James O. Watson, Columbus, Ohio; Howard E. Lamb, Denver; K. Grosvenor Bailey and Lucius B. Faires, Los Angeles; J. Clark Hovis, Highland Park, Mich., and James M. Eaton, Philadelphia.

Members of the executive committee are Edward T. Abbott and J. Gordon Hatfield, both of Los Angeles; Charles L. Ballinger, Toledo, Ohio; J. Willoughby Howe, Hollywood, Calif.; Frank A. Dilatush, Dayton, Ohio, and Orel F. Martin, Coral Gables, Fla.

Chairmen of the committees are: Membership, John P. Schwartz, Des Moines, Iowa, and Dr. Watson; local convention, Dr. Schwartz; rules and regulations, Dr. Faires; ethics, and representative on the hospital evaluating committee, Harry L. Collins, Chicago; editorial advisory, Arthur M. Flack, Jr.; ceremonial, H. Willard Sterrett, both of Philadelphia; graduate and postgraduate education, Dr. Howe; clinical research, Dr. Lamb; clearing, H. J. McAnally, Kansas City, Mo.; assembly location and convention executive, Dr. Martin; legislative, Dr. Watson; visual education, Ross B. Thompson, Glendale, Calif.; program, Howard A. Graney, and scientific exhibits, Byron L. Cash, both of Des Moines.

CENTRAL STATES OSTEOPATHIC SOCIETY OF PROCTOLOGY

The officers are: President, Harvey C. Seiple, Warren, Ohio; vice president, Frederick St. John, Zanesville, Ohio, and secretary-treasurer, E. R. Horton (re-elected), Ft. Wayne, Ind.

MISSOURI OSTEOPATHIC SOCIETY OF RADIOLOGY

The officers are: President, Carl Robert Beckmeyer (re-elected), Eureka; vice president, George W. Rea, Kirksville; secretary-treasurer, Eugene E. Lake (re-elected), Jefferson City; program, Robert C. Mitchell, Republic, and public relations, Mr. Harry J. Farrar.

Jack H. Grant, Chicago, was the principal speaker, his subject being "Colon Pathologies," at the meeting December 11 in Jefferson City. Other meetings were scheduled tentatively for February in St. Joseph, April in St. Louis, and May in Jefferson City.

OSTEOPATHIC PEDIATRIC SOCIETY OF LOS ANGELES COUNTY

The officers are: President, George W. Shaw, Alhambra; vice-president, Thomas F. Griffin, and secretary-treasurer, Edith A. Withey, the latter two of Los Angeles.

Committee chairmen are: membership and credentials, James M. Watson; constitution and by-laws, Fred Stone, both of Los Angeles; hospitals, Evangeline Percival, Alhambra, and program, Alex L. Lourie, Los Angeles.

PUGET SOUND ACADEMY OF APPLIED OSTEOPATHY

The program for the meeting in Seattle December 14 was scheduled to include: "Cranial Osteopathy and the Eye, Ear, Nose, and Throat," Mary Alice Hoover, Tacoma; "Facial Bones," H. V. Hoover, Tacoma, and William A. Newland, Seattle; "Physiological Movements of the Spine," H. V. Hoover; "Acute Infections in General Osteopathic Practice," review of an article by Laycock, Dr. Newland; "Physiology and Posture," Einer Petersen, Tacoma, and "Fibrotic Spine," John Martin Edmund and Martin D. Young, both of Seattle.

State and National Boards

ALBERTA

Examinations in April in Edmonton. Address Acting Registrar, G. B. Taylor, Office of the Registrar, Edmonton.

ARIZONA

Basic science examinations March 21 in Tucson. Applications must be filed 2 weeks prior to examination date. Address Francis A. Roy, Ph.D., secretary, Arizona Basic Science Board, University of Arizona, Tucson.

COLORADO

Professional examinations April 4. Address Walter W. King, M.D., secretary, State Board of Medical Examiners, 227 16th Street, Denver 2.

Basic science examinations, March 1, 2, in Denver. Applications must be filed before February 15. Address Esther B. Starks, D.O., secretary. Colorado Basic Science Board, 1459 Ogden Street, Denver.

CONNECTICUT

Examinations March 14. Address H. Wesley Gorham, D.O., secretary, Osteopathic Examining Board, 520 West Avenue, Norwalk.

DISTRICT OF COLUMBIA

Examinations May 8, 9, George Washington University Medical School, Washington. Applications should be filed April 1. Address G. C. Ruhland, M. D., Commission of Licensure, Room 4130 Municipal Building, Washington, D. C.

HAWAII

Examinations April 12. Address Mabel A. Runyan, D.O., secretary, Board of Osteopathic Examiners, 2333 C. Kalakaua Avenue, Honolulu 30.

ILLINOIS

Examinations in April in Chicago. Applications must be filed 10 days prior to examination. Address Mr. Charles F. Kervin, Superintendent of Registration, Department of Registration and Education, State House, Springfield.

IOWA

Basic science examinations, April 11, in Des Moines. Applications may be received up to the time of examinations. Address Ben H. Peterson, Ph.D., secretary, Iowa Board of Basic Science Examiners, Coe College, Cedar Rapids.

MASSACHUSETTS

Examinations March 14. Applications should be filed 2 weeks before examination. Address George Schadt, M.D., secretary, Board of Registration in Medicine, State House, Boston 33.

MICHIGAN

Officers of the Board of Osteopathic Registration and Examination are: President, Earl E. Congdon, Flint; vice president, Charles J. Manby, Battle Creek, and secretary-treasurer, Harry F. Schaffer, Detroit. Other members are Mark Hartfield, Detroit, and Roy G. Bubeck, Jr., Grand Rapids.

MINNESOTA

Basic science examinations April 4, in Minneapolis. Applications must be filed 1 week before examination. Address Raymond Bieter, M.D., secretary-treasurer, State Board of Examiners, 126 Millard Hall, University of Minnesota, Minneapolis 14.

Professional examinations, March 14. Address George F. Miller, D. O., secretary, Board of Osteopathic Examiners, 601 Dayton Ave., St. Paul 2.

MONTANA

Examinations March 7. Address Asa Willard, D.O., secretary, Board of Osteopathic Examiners, Wilma Bldg., Missoula.

NEBRASKA

Basic science examinations, May 2, 3, University College of Medicine, Omaha. Applications must be filed 15 days prior to examination. Address Mr. Oscar F. Humble, director, Bureau of Examining Boards, State House, Lincoln.

NEW HAMPSHIRE

Examinations March 9 in Concord. Address John S. Wheeler, M.D., secretary, Board of Registration in Medicine, State House, Concord.

NEW MEXICO

Basic science examinations May 7. Address Miss Margaret Kilkenny, Assistant Secretary of State, c/o Office of Secretary of State, Sante Fe.

OREGON

Basic science examinations March 4 in the Lincoln High School, Portland. Address Charles D. Byrne, Ph.D., secretary, State Board of Higher Education, Eugene.

RHODE ISLAND

Professional examinations April 6. Basic science examinations in May. Applications may be filed any time subsequent to second completed year of professional training. Address Mr. Thomas B. Casey, Administrator of Professional

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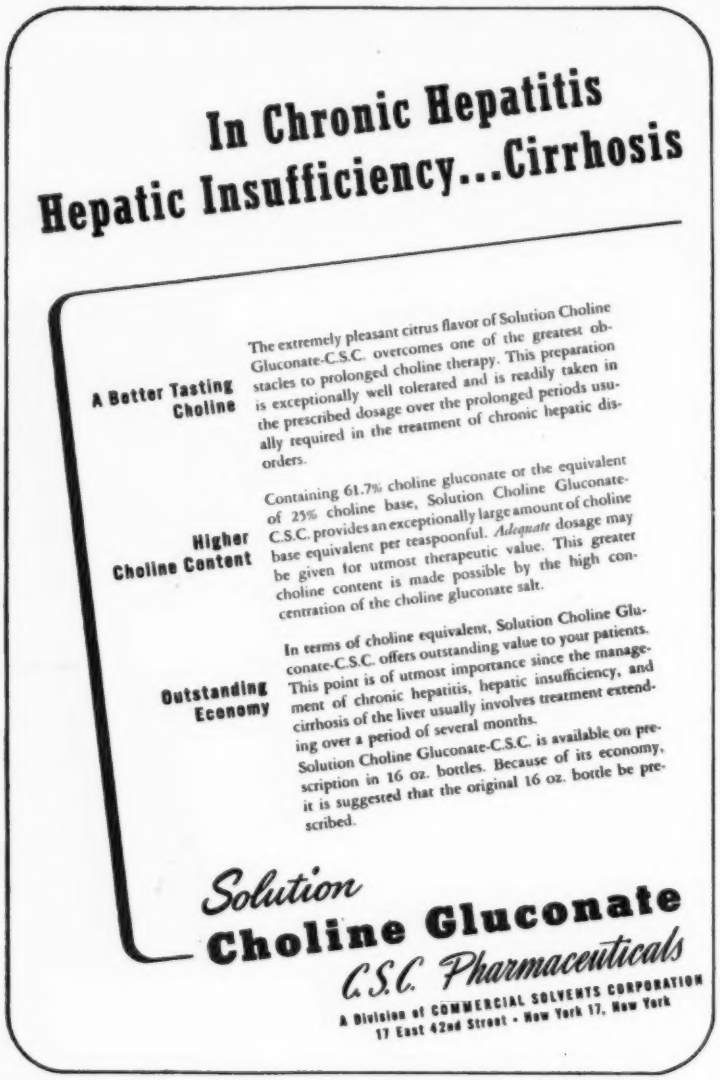
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TENNESSEE

Marion Edward Coy has been reappointed to the Board of Osteopathic Registration and Examination for a 5-year term.

TEXAS

Basic science examinations April 21-22. Address the Board of Examiners in the Basic Sciences, 306 Nalle Bldg., Austin.

WISCONSIN

Basic science examinations April 1 at the Assembly Chamber, State Capitol, Madison. Applications must be filed by March 25. Address Prof. W. H. Barber, secretary, Board of Examiners in the Basic Sciences, 621 Ransom Avenue, Ripon.

RE-REGISTRATION OF OSTEOPATHIC LICENSES

March 1 — Colorado, $2.00. Address George H. Gillen, M.D., secretary, State Board of Medical Examiners, 831 Republic Bldg., Denver.

March 31 — Georgia; no registration fee, professional tax, $15.00. Address Russell E. Andrews, D.O., secretary, Board of Osteopathic Examiners, 304 First National Bank Bldg., Rome.

April 1—Wyoming, $2.50. Address G. M. Anderson, M.D., secretary, State Board of Medical Examiners, State Capitol, Cheyenne.

April 15 — Montana, $2.00 for residents; $1.00 for non-residents. Address Asa Willard, D.O., secretary, Board of Osteopathic Examiners, Wilma Bldg., Missoula.

May 1 — Iowa, $1.00. Address Mr. Dwight S. James, assistant secretary, Board of Osteopathic Examiners, 200 Walnut Bldg., Des Moines 9.

May 1—Washington, $2.00. Address Mr. George C. Starlund, acting director, State Department of Licenses, Olympia.

EXAMINATIONS BY NATIONAL BOARD

The National Board of Examiners for Osteopathic Physicians and Surgeons conducts Parts I and II of its examination on the first Thursday and Friday of each May and December at the six approved colleges. Application blanks may be obtained from the secretary, and the completed application blank together with a passport photograph and check for the part or parts to be taken, must be in the Secretary's office by the November 15, or April 15 preceding examination. Part III of the examination will be given in specific locations at the discretion of the Board for the convenience of the applicant.

Examinations in Part I consist of anatomy, physiology, pathology, chemistry, and bacteriology. Part II consists of examination in mental diseases, surgery, obstetrics and gynecology, pediatrics, public health, osteopathic theory and practice. Part III is an oral examination.

Address John E. Rogers, D.O., secretary, 16 Mount Vernon Street, Oshkosh, Wisconsin.

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Color is employed functionally in so many ways today that it often is taken for granted. You see color at work in buildings, ships, trains, airplanes — in such a way as to make people more comfortable, more at ease, happier, more efficient.

As manufacturers of paints and pigments since 1917, my company has amassed much experience with colors. Many of its tested color specifications have been incorporated into a system it calls "color conditioning."

Perhaps it is fitting that the actual birth of "color conditioning" took place in a hospital. My company's first venture into the functional application of color occurred when a New York surgeon, Dr. P. J. Flagg, was bothered by the intense glare from the glossy white walls in the operating room. He felt that by using color on these walls, the glare could be eliminated. He came to my company for a solution and as a result, we developed a shade known as "eye rest green," which is the complementary color of human tissue. The effectiveness of this suggestion has now become appreciated and the idea generally accepted.

In 1941, my company felt that seeing conditions in the machine tool industry could be improved. We collaborated with Mr. Arthur Brainard of the Phila-

*Presented at the Southeastern Industrial Vision Congress, Atlanta, Georgia, November 6-8, 1949. Mr. Quisenberry is manager of the Maintenance Sales Department, du Pont. Reprinted by permission from *The Optometric Weekly*, December 1, 1949.

delphia Electric Company in a study as to what colors on machines would reflect the greatest amount of light for efficient seeing and still be practical from a maintenance standpoint. The result of this study produced our "three-dimensional seeing" program, utilizing functional color to provide contrast, with the material being worked on the machines so that they would stand out in bold relief. The results were so effective that it was immediately accepted by industry and proved useful in helping achieve our war production records.

In 1944, my company took another step in harnessing color for functional purposes through the introduction of the "safety color code," based on much research. Through popular acceptance, the "du Pont safety color code" has become a standard safety color system applicable to all types of industry. It is effective because it attracts the worker's attention, calls forth specific pre-determined associations, and respects previous usage. Its value in reducing industrial accidents has been proved. It has been adopted by the United States Navy as standard and is the principal safety color code used by industry today.

Based on the success of these ventures, my company was encouraged to take further steps for utilizing color in order to take advantage of its psychological and functional contributions. We next approached industrial plants. Here is some background on this problem. Factories were first built to house machines. The conception that they must be places of human habitation for the workers who were to operate the machines came much later. Only today, after more than 100 years of steady progress, after the expenditure of an immense amount of constructive effort and applied research and with the added impetus of two great wars fought to a large extent on the "factory front," have we come fully to realize the implication of that essentially simple requirement that industrial plants should be places fit for people to live in.

Those first plants were built very close around steam engines with their boiler houses and their reeking chimneys. They were products of the coal and steam age and almost without consideration they came to be grimey—gray—forbidding. Concurrently with the realization that workers are spending most of their active lives in the factory has come the development of the electric motor and it is hardly an exaggeration to say that the combined efforts of these two factors is a second revolution. The reasonable amenities of civilized home life—light, air, physical comfort, social intercourse, good food, music, color—all have become not possibilities, but accepted practicalities in our industrial life.

The acceptance of color by industry is now well established. Many of our leading manufacturers have endorsed "color conditioning" as an aid in promoting efficiency, increasing production, improving quality, reducing personal injuries and improving employe management relations.

It was my company's feeling that the principles of functional color which had proved themselves so ably in industry could be utilized to advantage in many other fields where the comfort of the public is to be considered and where the psychological benefits of color could be employed intelligently.

It was with this in mind that my company decided to enlarge the scope of "color conditioning" and make it available to such institutions as schools, hospitals, merchandising establishments, hotels, restaurants and the like.

Much information and misinformation has been published on the subject of functional color, so my company felt that in the development of a sound program, theories and personal preferences should be discarded. It took into consideration only those things which could be supported by factual evidence and authoritative backing.

We discussed our problem with architects, lighting engineers, vision specialists, psychologists, interior decorators, color consultants and individuals whom we felt could contribute worth while information on this subject.

We were then faced with the problem of condensing this information and assembling these facts so that the average layman could clearly grasp our meaning and understand the fundamental principles of the program.

Based on this study, we determined those functions which color could be relied on to perform. We have segre-

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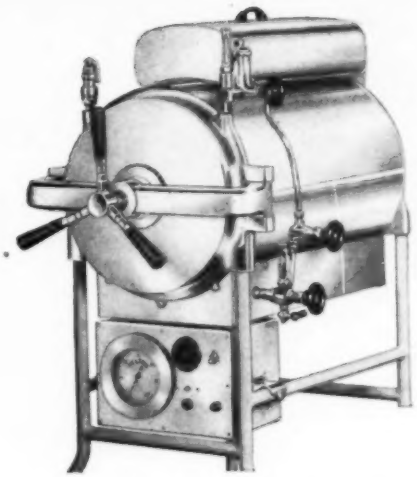

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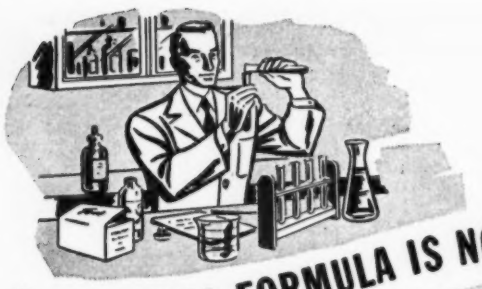

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gated these functions under 11 headings as follows:

Brightness Engineering

One of the most important factors in developing a comfortable as well as an efficient seeing environment is brightness engineering. High visibility, ease of seeing and good seeing conditions are overwhelmingly the result of good brightness engineering.

The human eye is regulated by the amount of light that enters it. When the eye is confronted with dull colors, it opens up. When brightness enters, the pupil contracts. Since this action is muscular, the eye becomes fatigued when there are too many differences in light and dark in any given area. The result is eyestrain.

Studies by lighting authorities and vision specialists show that the eyes see best when all the areas in the field of view are approximately of the same brightness. The next best situation is where the "operation" (machine, desk) is slightly brighter than its environment. By that we mean the walls and the floors. The least desirable situation is that in which the environment is greatly brighter than the task.

In this connection, brightness ratios within the limits of 5 to 1 are ideal (10 to 1 are permissible). This means that the reflected light from any given surface in any area should not be more than five times brighter than any other surface. Or putting it another way, a white wall reflects about 85 per cent of the light that hits it, a black machine reflects about 5 per cent. If we divide 85 by 5, we find the ratio of 17 to 1. The contrast here is too great for good seeing conditions and the efficiency of the worker is reduced.

A good yardstick to follow when setting up proper brightness ratios is to see that the following requirements are met:

1. Ceilings should be white for maximum light reflection.
2. Floors should be as light as practical with a reflectance of 15 to 30 per cent.
3. Fixtures and equipment should reflect from 25 to 40 per cent.
4. Walls should reflect between 50 and 60 per cent. If brighter than this, they will introduce glare which diverts attention from the task.

Color Preferences

It is human for people to like color rather than black or gray. Preference for color follows almost a universal order. Regardless of race, nationality or creed, people like certain colors better than others.

In order to determine these color preferences, we have conducted polls on this subject. People were asked to choose between one color swatch and another of the same size and shape. Where other influence exists, such as style or vogue, the reactions of people may be differently affected. However, most people have a simple liking for color and will in the main show an instinctive pleasure in blue, red and green above all other hues. That was confirmed by our polls.

This preference for blue and red is understandable when it is analyzed. Blue and red are the principal colors in our flag and we are taught to respect and admire these colors from infancy. Therefore, it is only normal that we should accept them wherever they appear. Green, which is the third choice in popularity, achieves this position because it is the one color to which the eye is most accustomed. It is a predominating color of nature and we accept it like an old friend and familiar face.

The advantage of knowing which colors are high and which colors are low in popularity is understandable. In suggesting and recommending colors for the interior or exterior of a store, hospital, hotel or apartment, the obvious advantage of selecting colors which are pleasing to the masses is readily appreciated. It is a practical application of the principle "giving the public what it likes." Personalized decoration or styling may require more subtlety.

We have charted these color preferences, using the colors of the spectrum and indicated by graphs those colors which are high and those colors which are low in the preferences of most people.

Emotional Reaction to Color

We all appreciate that individuals respond to color in much the same manner that they respond to music. We have colors which are exciting and colors which are soothing. We have colors which are warm and colors which are cool. We have colors which are high in energy value and those colors

which are definitely subduing. The problem is to select the color best suited for the task.

Here, again, we have charted the colors of the spectrum according to their emotional value and classified them as "exciting," "tranquil," "subduing." The most exciting colors are red-orange, red, and orange. Greenish blues (turquoise) likewise are more compelling than ultramarine or purplish hues. The most subduing of all colors are blue violet, violet and blue. Tranquil effects are predominantly in the yellow green, green and blue green region of the spectrum. Most people show psychological responses to color as outlined above. These reactions, therefore, can be considered as of universal order.

The emotional reaction to color offers therapeutic benefits to hospitals. It is understandable that persons in a highly nervous condition should not be placed in an environment where bright, strong, exciting colors predominate. It is best to surround them with either tranquil or subduing colors for obvious reasons.

Conversely, individuals who suffer from melancholia should be placed in an environment where bright and gay colors predominate, to counteract this condition.

It can be easily appreciated how the emotional qualities of color can be utilized to advantage in many ways every day.

Warmth and Coolness in Color

Psychological responses to color should be capitalized on. For instance, color can be used to compensate for unfavorable room temperatures, either to psychologically condition the room on the cool or warm side. Here, again, we have divided the colors of the spectrum into groups which could be classified as "decidedly warm," "pleasantly cool," "definitely frigid."

Seemingly cool areas may be psychologically warmed through the use of colors, such as peach, beige, buff, yellow and ivory. Contrarywise, blues, blue greens, and greens will appear cooler and, consequently, are desirable in actually offsetting warm room temperatures.

Appetite Appeal in Color

Through a curious psychological fact, certain colors appear to be appetizing, while other colors exercise an unfavorable reaction when associated with food.

Here, again, we have used the colors of the spectrum to indicate the relative appetite appeal of the various hues. You will note we have classified these as to light and deep tones of the same shades. Such a classification is necessary, for we may find, for example, that a light tint of yellow is extremely appetizing, while the deep tone is definitely unappetizing.

The eye and the stomach are very closely related in their reaction. Seasickness is an excellent example. Yellow green, which is definitely unappetizing, will have a very unfavorable reaction on any individual who is slightly inclined to nausea. Therefore, yellow greens should be avoided as the principal color not only in areas where food is served, but also for transportation equipment as well, such as airliners, sea-going vessels, bus and train interiors and the like.

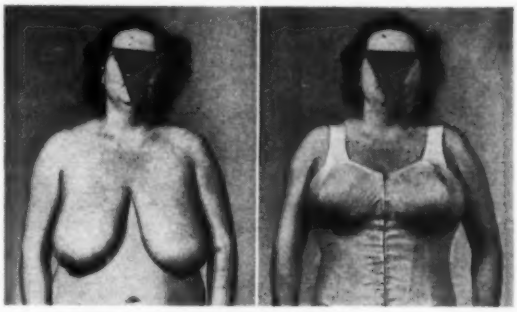
In cafeterias, dining areas or any place where food is served, it is only logical that colors which are high in appetite appeal should predominate.

Featuring Color Through Complementation

Every color has an after image of its complement. If, for example, you stare at a red disc for a few seconds, then gaze at any white area, you will see a blue-green disc as the after image. This is true of all colors and the proper knowledge of complementary colors will enable you to emphasize any given color area by giving it a background of its complement. The human skin, for instance, is flattered by blue green walls. Therefore, if you are selecting a shade for a beauty salon, barber shop or any area where it is highly desirable to flatter the individual, a shade of blue-green would be the preferred choice.

The value of complementary colors plays an important part in merchandising. The beauty of an object or the sales appeal of merchandise can be enhanced through intelligent color selection. An orange cake will sell better on a blue doily, or a green necktie against a pale yellow background.

Through the principle of color complementation not only can the eye be pleased, but also compelling forces may



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be put into operation to influence a variety of desired reactions.

Color and Climate

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The visibility of color is of greatest importance where advertising signs and safety locations are to be made highly noticeable.

In studying visibility, we find that yellow-orange and yellow-green are easily discernible and have a strong attraction for the eye. Red and red orange also are quite dominant in this respect. White, gray or black are passive colors; therefore, almost any color will compel notice over them.

From the standpoint of maximum visibility, we have determined that the combination of yellow and black provides the greatest possible degree of readability; whereas, red and blue are very poor in this respect as the wave lengths of these two colors conflict, red having a very short wave length and blue having a long wave length.

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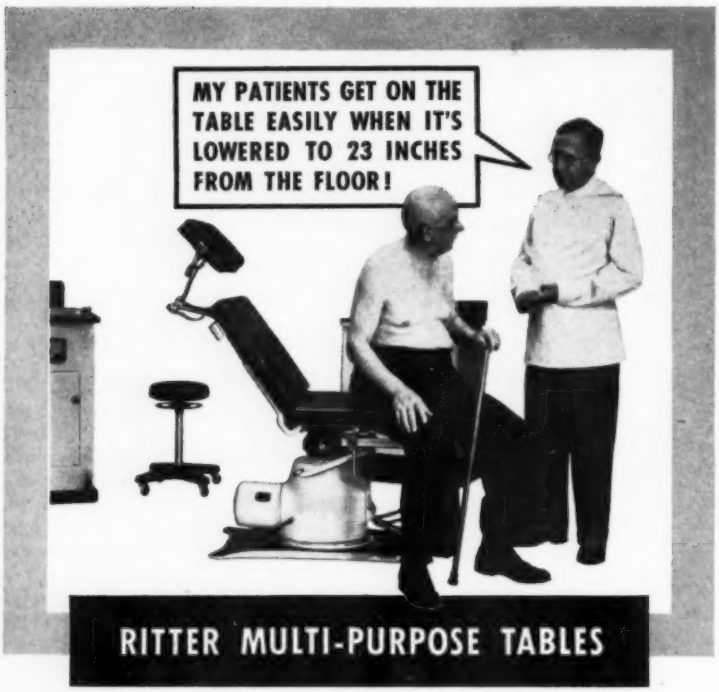

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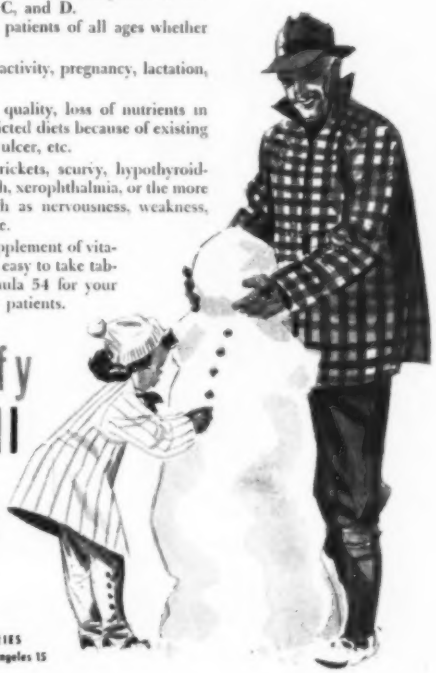

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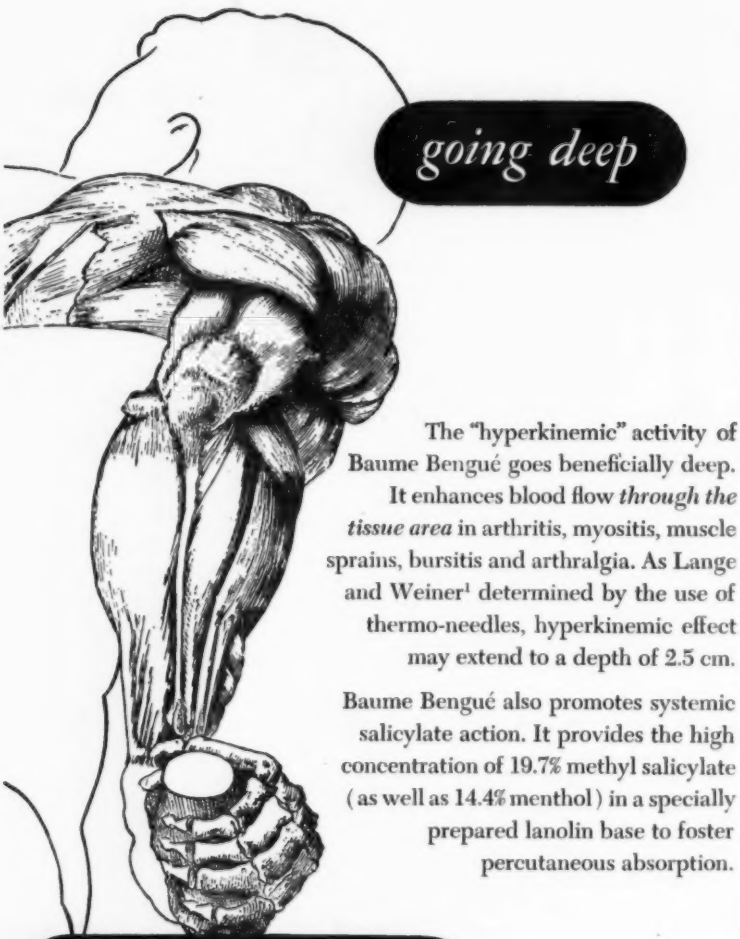

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1. Lange, K., and Weiner, D.: J. Invest. Dermat. 12:263 (May) 1949.

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Books Received

FUNCTIONAL FOOT DISORDERS. With Particular Reference to their Effect on the Lower Extremity. By John Martin Hiss., B.S., M.A., D.O., M.D., Sc.D., Orthopaedic Surgeon, Director of the Hiss Clinic, Los Angeles, Special Clinical Lecturer on Functional Disorders of Lower Extremity, Author of "New Feet for Old," "Treatment and Care of Feet," etc. and a Digest of each Chapter by John Martin Hiss, Jr., A.A., M.D., D.N.B., Associate in Internal Medicine, The Hiss Clinic, Medical Officer United States Air Force. Ed. 3, completely revised. Cloth. Pp. 824, with illustrations. Price $11.50. The Oxford Press, Los Angeles, 1949.

QUESTIONS MEDICAL STATE BOARD AND ANSWERS. By R. Max Goepp, M.D., Formerly Professor of Clinical Medicine, Graduate School of the University of Pennsylvania, and Professor of Medicine, Woman's Medical College of Pennsylvania; and Harrison F. Flippin, M.D., Associate Professor of Medicine at the Graduate School of the University of Pennsylvania. Ed. 8. Cloth. Pp. 663. Price $7.00. W. B. Saunders Company, West Washington Square, Philadelphia, 1950.

PHYSIOLOGY OF THE NERVOUS SYSTEM. By John Farquhar Fulton, O.B.E., M.D., D.Sc., LL.D., Sterling Professor of Physiology, Yale University, Formerly Fellow of Magdalen College, Oxford. Ed. 3, revised. Cloth. Pp. 667, with illustrations. Price $10.00. Oxford University Press, 114 Fifth Avenue, New York 11, 1949.

THE PRACTICE OF UROLOGY. By Harry C. Rolnick, M.D., Professor and Chairman of the Department of Urology, Chicago Medical School; Attending Urologist, Michael Reese Hospital, Mount Sinai Hospital and Cook County Hospital, Chicago. Volumes I and II. Cloth. Pp. 1246, with illustrations. Price $24.00. J. B. Lippincott Company, East Washington Square, Philadelphia, 1949.

HELPFUL HINTS TO THE DIABETIC. By William S. Collens, B.S., M.D., Chief of the Diabetic Clinic; Chief of the Clinic for Peripheral Vascular Diseases; Associate Attending Physician, Maimonides Hospital; Attending Physician, Metabolic Diseases, Jewish Sanitarium and Hospital for Chronic Diseases, Brooklyn, New York; Consultant in Metabolic Diseases, Rockaway Beach Hospital, New York City, and Louis C. Boas, A.B., M.D., Chief of the Diabetic Clinic, Associate Visiting Physician, Greenpoint Hospital; Associate Physician, Metabolic Diseases, Jewish Sanitarium and Hospital for Chronic Diseases; Adjunct in Medicine, Beth El Hospital; Assistant Physician, Maimonides Hospital, Brooklyn, New York. Cloth. Pp. 136, with illustrations. Price $3.00. Charles C. Thomas, Publisher, 301 E. Lawrence Avenue, Springfield, 1949.

RECENT ADVANCES IN PHYSIOLOGY. By W. H. Newton, M.D., M. Sc. (Manch.), D.Sc. (Lond.) Professor of Physiology in the University of Edinburgh. Ed. 7. Cloth. Pp. 269, with illustrations. Price $4.50. The Blakiston Company, 1012 Walnut Street, Philadelphia 5, 1949.

ELECTROCARDIOGRAPHY. Fundamentals and Clinical Application. By Louis Wolff, M.D., Visiting Physician, Consultant in Cardiology and Chief of the Electrocardiographic Laboratory, Beth Israel Hospital, Associate in Medicine, Harvard Medical School. Cloth. Pp. 187, with illustrations. Price $4.50. W. B. Saunders Company, West Washington Square, Philadelphia, 1950.

MANUAL OF PHARMACEUTICAL LAW. By William Pettit, Lecturer in Pharmaceutical Jurisprudence, University of Pittsburgh. Cloth. Pp. 170. Price $2.75. The Macmillan Company, 60 Fifth Avenue, New York, 1949.

ESSENTIALS OF OBSTETRICAL AND GYNECOLOGICAL PATHOLOGY. By Robert L. Faulkner, M.D., F.A.C.S., Assistant Professor of Gynecology, The Western Reserve Medical School; Associate Gynecologist, University Hospitals of Cleveland, Ohio, and Marion Douglass, M.D., Formerly Assistant Professor of Gynecology, The Western Reserve Medical School. Ed. 2. Cloth. Pp. 358, with

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illustrations. Price $8.75. The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, 1949.

CLINICAL PATHOLOGY. Application and Interpretation. By Benjamin B. Wells, M.D., Ph.D., Professor of Medicine, University of Arkansas School of Medicine, Little Rock, Arkansas. Cloth. Pp. 397, with illustrations. Price $6.00. W. B. Saunders Company, Philadelphia, 1950.

INTESTINAL INTUBATION. By Meyer O. Cantor, M.S., M.D., F.A.C.S., Assistant Attending Surgeon, Grace Hospital; Formerly, Senior Attending Physician, Deaconess Hospital, Detroit, Michigan. Cloth. Pp. 334, with illustrations. Price $7.50. Charles C Thomas, Publisher, 301-327 East Lawrence Avenue, Springfield, 1949.

SUPPLEMENT TO THE BOOK OF THE STATES, July, 1949. Paper. Pp. 154. Price $2.00. The Council of State Governments, 1313 E. 60th Street, Chicago 37, 1949.

PHYSIOLOGY OF HEAT REGULATION AND THE SCIENCE OF CLOTHING. Edited by L. H. Newburgh, M.D., Professor of Clinical Investigation, The Medical School, University of Michigan. Cloth. Pp. 457, with illustrations. Price $7.50. W. B. Saunders Company, West Washington Square, Philadelphia, 1949.

FROM THE HILLS. An Autobiography of a Pediatrician. By John Zahorsky, M.D. Cloth. Pp. 388. Price $4.00. The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, 1949.

POSTURAL MECHANICS. By Byram Campbell. Cloth. Pp. 219. Salt Lake City, Utah. 1949.

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McDonald, Marvin T., (Renewal) Elm Street Hospital & Clinic, Denton

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Cheatham, Riley F.
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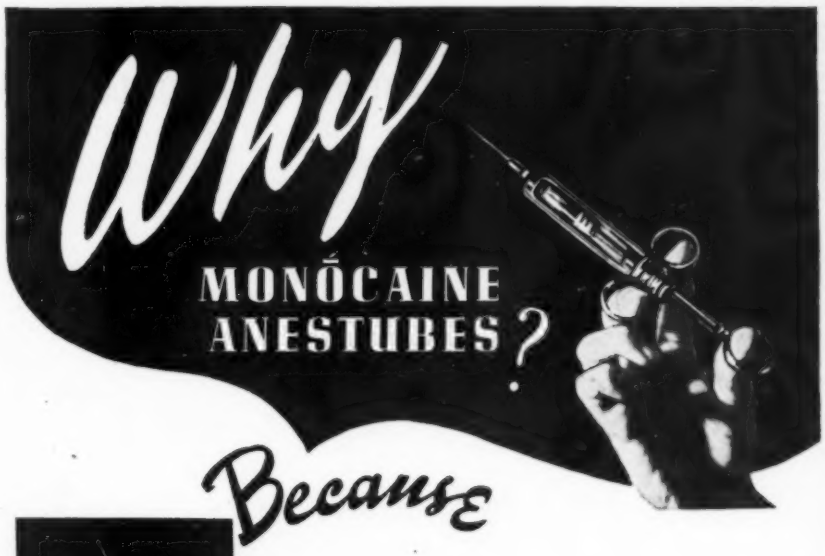
Coons, Robert Newton
Dannin, Arthur Edwin
Dodge, John Warren
Humphrey, Rollin A.
Kennedy, Earle Lewis
Leach, Jack Phillip
Macek, Otto John
McClimans, Leslie Alvin
Messham, Richard Hugh, Jr.
Paulson, Joseph William
Rawls, Robert N., Jr.
Schaefer, Robert Carl
Seeglitz, William Albert
Shannon, Emerson Grant
Strangio, Vincent J.
Swift, Richard Joseph
Trimmer, Paul Wilbur
Wackerle, Harold Beahm
Weinberg, Friedman
Young, Donald David
Zimmerman, Raymond Joseph
Wicks, Howard



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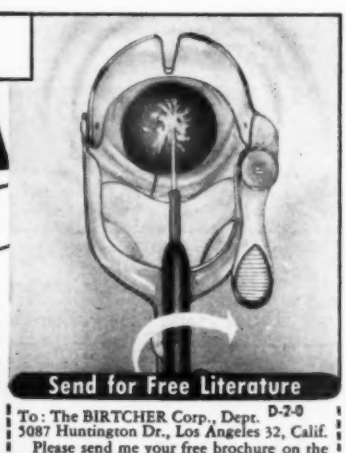

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Anderson, Roger B., from Manning General Hospital & Clinic, to Anderson Clinic, Manning, Iowa

Barbaree, Charles P., from Maud, Texas, to De Kalb, Texas

Beach, O. Lamson, from 31 54th St., N., to 341 Third St., N., St. Petersburg 4, Fla.

Benedict, Helen E., from Crum Lynn, Pa., to 1515 W. Market St., Bethlehem, Pa.

Bilyea, Maurice A., from 335 Fairlawn Ave., to 12 Brooke Ave., Toronto 12, Ont., Canada

Blair, Glenn Doty, from 660 17th St., to 732 18th St., Merced, Calif.

Brodsky, Samuel, from Philadelphia, Pa., to Bay View Hospital, 23200 Lake Road, Bay Village, Ohio

Browning, Zack C., from San Francisco, Calif., to Lawson Hospital, Atlanta, Ga., (Released from service)

Bruner, William R., from 408½ W. Temple St., to 401 N. Shipp St., Hobbs, N. Mex.

Chace, John Andrew, KCOS '41; Cedar Dell Springs, North Dartmouth, Mass.

Chadwell, Paul W., from Tucson, Ariz., to Estancia, N. Mex.

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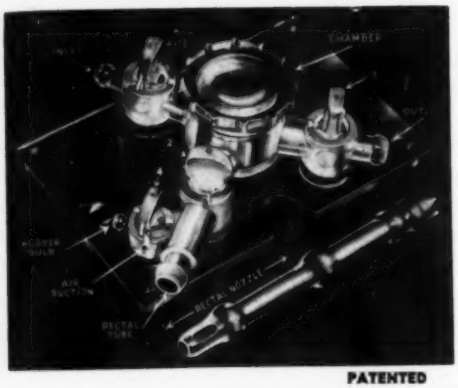

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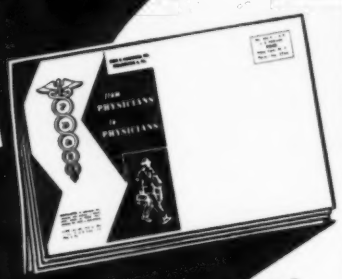

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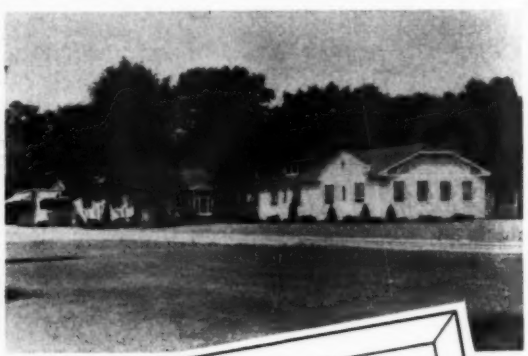

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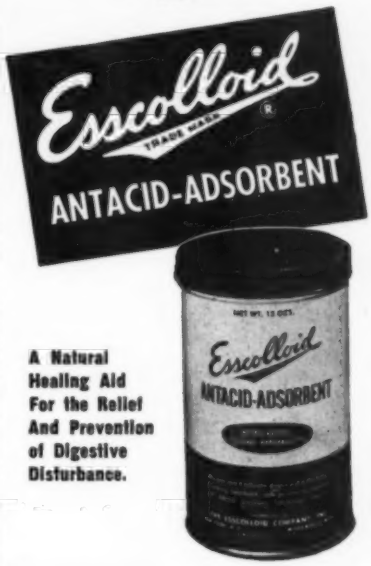

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Peptic Ulcers tend to recur.

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Colloidal neutralization reduces painful hyperacidity.

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1. Inhibits appetite to a clinically significant degree
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3. Encourages greater physical and mental activity
4. Increases sense of gastric "fullness" by salivary stimulation
5. May be taken, undetectably, anywhere, anytime

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THE DOSAGE-FORM OF PREFERENCE
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(1 Freed, J.A.M.A., Feb. 8, 1947)

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